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NORDIC SEAS SEDIMENTATION DATA FILE VOLUME 2 CURRENT
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N00014-85-C-0001

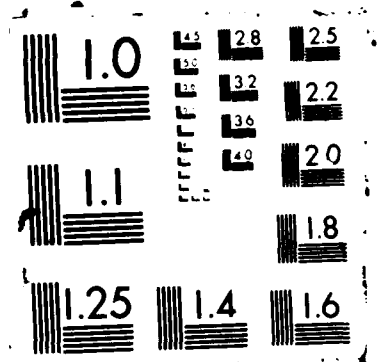
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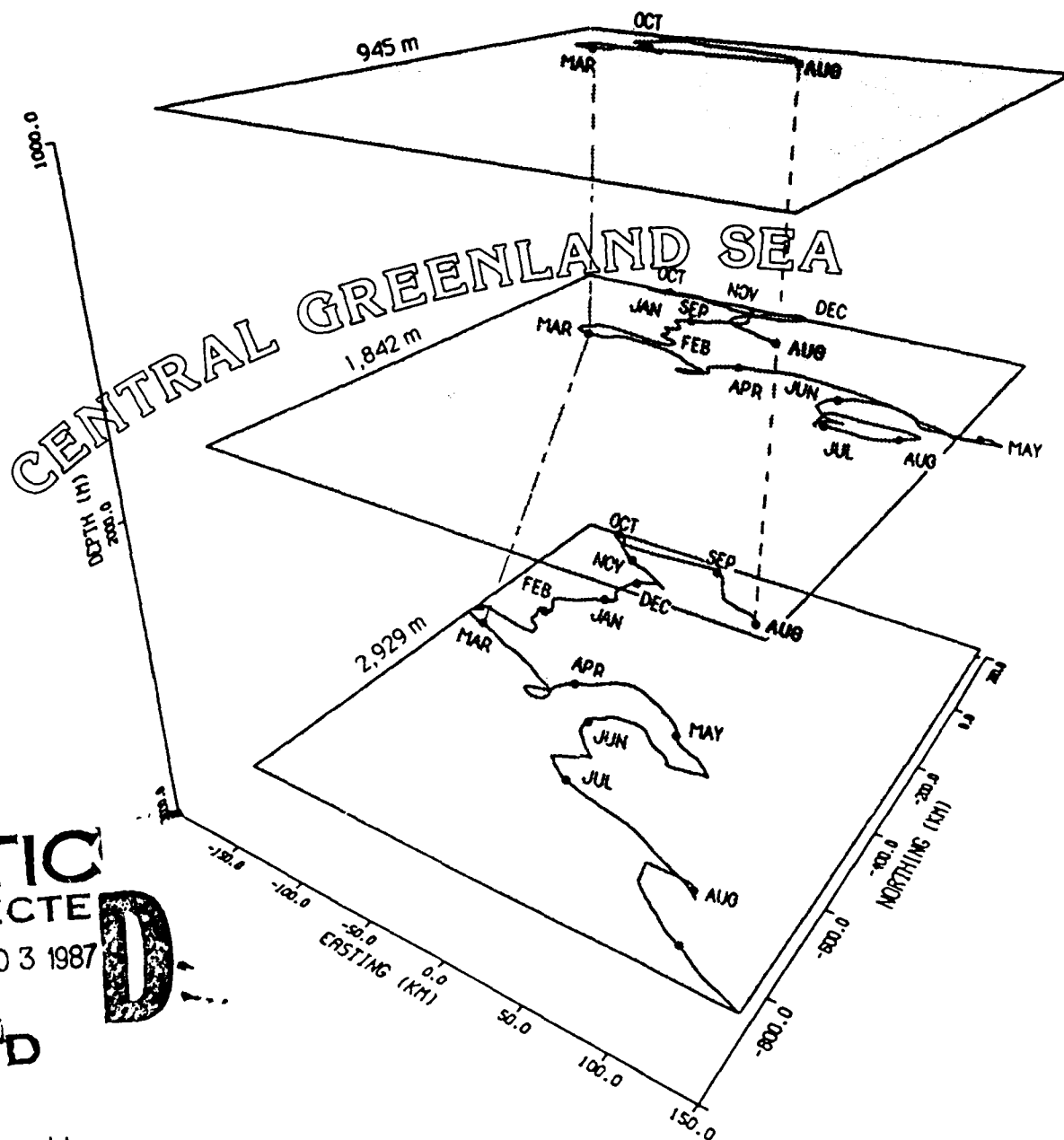
Woods Hole Oceanographic Institution, USA
University of Kiel, FRG

WHOI-87-18

NORDIC SEAS SEDIMENTATION
DATA FILE, Vol. 2, 1987

AD-A183 706

Current Measurements from the Northern Nordic Seas 1983 - 1986



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Office of Naval Research
Arlington, Virginia USA

WHOI-87-18

Current Measurements from the
Northern Nordic Seas
1983 - 1986

by

Susumu Honjo, Christine M. Wooding, and Gerold Wefer*

Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543

*Institute of Geological Sciences
University of Bremen
Bremen, Federal Republic of Germany

February 1987

Technical Report

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David A. Ross, Chairman
Geology and Geophysics Department

Joint Program:

Woods Hole Oceanographic Institution
and
University of Bremen, FRG

NORDIC SEAS SEDIMENTATION

DATA FILE, Vol. 2

CURRENT MEASUREMENTS FROM THE

NORTHERN NORDIC SEAS

1983 - 1986

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Nordic Seas Sedimentation: Data File; Volume 2

Current Measurements from the Northern Nordic Seas,
1983 - 1986

by

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Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543

*Institute of Geological Sciences
University of Bremen
Bremen, Federal Republic of Germany

April, 1987

Abstract:

Records from ten Aanderaa current meters deployed along with 5 current meter/sediment trap mooring arrays in the Fram Strait and Greenland Basin, each deployed for approximately one year between 1983 and 1986, are presented in this data file. Data included are, current vectors, temperatures, frequency spectra, and two- and three-dimensional vector diagrams.

Introduction

Supported by the United States Office of Naval Research, the Woods Hole Oceanographic Institution (WHOI) in cooperation with the University of Kiel and the University of Bremen, Federal Republic of Germany, has conducted basin-wide sedimentological research in the Nordic Sea since the summer of 1983. One of the major field programs was the deployment of 16 moorings with sediment traps and current meters for a period of about one year throughout the basin between 1983 and 1988. As the first step in the program, we deployed 6 year-round moorings between August, 1983 and August, 1986 in the Fram Strait and Norwegian Basin (Fig. 1). In the second phase of the study, sediment trap and current meter deployments will continue around Iceland and coastal Greenland in cooperation with the Marine Research Institute, Reykjavik (refer to Fig. 1 and Table 1).

On five of the mooring arrays deployed in the northern Nordic Seas, Aanderaa current meters with thermister chains were attached. At least one of the current meters on an array was positioned close to the sediment trap - usually 50 or 100 meters below the trap. Information on the design of the mooring arrays deployed in the Nordic Seas experiment will be published elsewhere in this data series. Of the 11 current meters deployed in this area, two meters (the only current meter on the BI-1 station, off Bear Island-Storfjord, and one of three deployed at the shallower depth at GB-1 station, Greenland Basin during 1985-1986) failed to record data. At the Lofoten Basin Station (LB-1) 2 current meters were deployed at 2,650 m and 2,975 m. Although both current meters worked, the record from only the shallower instrument is included in this data file.

All other current meters functioned for about one year or a slightly shorter period, and the data greatly contributed to an understanding of the relationship between current and mass fluxes of ocean particles in this area. In this data file are presented current vectors, vector components, vector average diagrams and temperature records. Also, the east and north components of frequency auto-spectrum and frequency rotary spectrum were computed and attached. We follow the style taken by "Fram Strait Current Measurements, 1984-1985" by Aagaard *et al.*, 1985, 85 pp., published in Bergen, Norway, to compile this data file.

Technical note

For spectrum calculations, each data series was divided into roughly 5 pieces, each about 2-1/2 months long (2048 hourly points, 512 4-hourly points). Means were removed from each piece separately, and they were pre-whitened. Pre-whitening is using first differences, in the time domain, to reduce the low-frequency components of a series. On plotting, the spectra were averaged in increasingly large groups at the high frequencies to reduce superfluous points. They also were "re-colored" to restore the low-frequency information. The confidence levels indicate how closely the spectral estimates match the true variance. The rotary spectra represent the circular decomposition of a 2-dimensional vector series into clockwise (here, negative) and counterclockwise (positive) harmonic components. Unfortunately, only 4-hourly data was available for LB-1. All other spectra are on hourly data.

Acknowledgments

The Nordic Sea is one of the most difficult ocean areas for oceanographic logistics. We have received a great deal of help and good will from international colleagues in pursuing this project. In particular, Dr. Jörn Thiede, Chief Scientist of the 1984 and 1985 legs, rendered us every possible opportunity to make this experiment successful on board R/V Polarstern, Alfred Wegener Institution for Polar and Marine Research, Bremerhaven. In memory of the first recovery cruise in 1984 on board R/V Polarstern, a track chart of Arktis II, leg 4 is included in this data file as Fig. 2. We also thank R/V Meteor (old) and the Deutsche Hydrographische Institute, Hamburg, which supported us during a difficult mission to recover a malfunctioned mooring and to deploy a large array in the Greenland Sea during 1985. Dr. Jens Meike made recovery of the FS-1 mooring possible through his care and competence as Chief Scientist of R/V Valdivia during the summer of 1985.

Dr. Vernon Asper, University of Southern Mississippi, Steven Manganini and Dorinda Ostermann, WHOI, contributed to the preparations and deployment of arrays in this difficult ocean. Their dedication and imagination made this program take off. Peter Clay and Thomas Crook provided vital assistance in recovering a stranded GB-1 mooring in the summer of 1985 on board R/V Meteor (old).

Without the encouragement and funding support from the Office of Naval Research, this basin-wide sedimentation study would never have been started. We sincerely thank Dr. G. Leonard Johnson for his insight and commitment to this project.

Table 1.

MOORINGS IN THE GREENLAND BASIN/NORWEGIAN SEA, 1983-1986.

No. Year	ID No.	Location	Latitude/ Longitude	Water depth (m)	Mooring height (m)	No. 501b spheres	Trap type and number/mooring	Trap depth, m (off floor)	Cups/ duration dys:hrs	Extra Instrs.	Deploy/ Recov:	Ship: dep/rec
1	1983 LB-1	Lofoten Basin	69°30.11'N 10°00.02'E	3,161	432	25	Mark 5 (1)	2,761 (400)	12/ 30:0	2 CM 2 DEP	8/11/83 8/15/84	Pstern/ Pstern
Same mooring moved north as BI-1 in 1984.												
2	1983 GB-1	Greenland Basin	74°32.31'N 06°39.82'W	3,417	2,008	34	Mark 5 (2)	2,817 (600) 1,452	12/ 30:0	2 CM 3 DEP	8/1/83 7/30/85	Pstern/ Meteor
Recovery delayed 1 year due to release battery problem. Successfully recovered in 1985. (1965)												
3	1984 BI-1	West of Storfjord	75°51.35'N 11°28.01'E	2,123	473	25	Mark 5 (1)	1,700 (418)	12/ 30:4	1 CM 2 DEP	8/12/84 8/17/85	Pstern/ Pstern
Last cup closed 14:00: 8/10/85. To be moved to LB-2 in '85 w/Kiel release.												
4	1984 FS-1	Central Fram Str.	78°51.9'N 01°22.0'E	2,527	2,079	15	Mark 6 (1)	2,442 (381)	13/ 27:5	1 CM 1 TMM 2 DEP	8/20/84 7/30/85	Pstern/ Meteor
#13 closed 0900: 7/19/85. Transmissometer worked all year long. Redeployed in FS-2 location; app. 50 miles east.												
7	1985 GB-2	Greenland Basin	74°35'N 06°43'W	3,445	2,008	34	Mark 5 (2)	2,823 (622) 881 (2564)	25/ 14:0	None	8/02/85 8/23/86	Meteor Valdivia
All equipment worked.												
8	1985 FS-2	Central Fram Str.	79°00'N 04°55.0'E	2,430	1,862	32	Mark 6 (2)	1,929 (501) 1,000 (1,500)	13/ 27:0	1 CM 1 TMM	7/29/85 8/17/86	Pstern Valdivia
Only 5 cups worked. Transmissometer flooded. Current record OK.												

ID No: ONR/WHOI mooring identification number

Ship, deployment and recovery:

Pstern: R/V Polarstern, Bremerhaven

Meteor: R/V Meteor, Hamburg

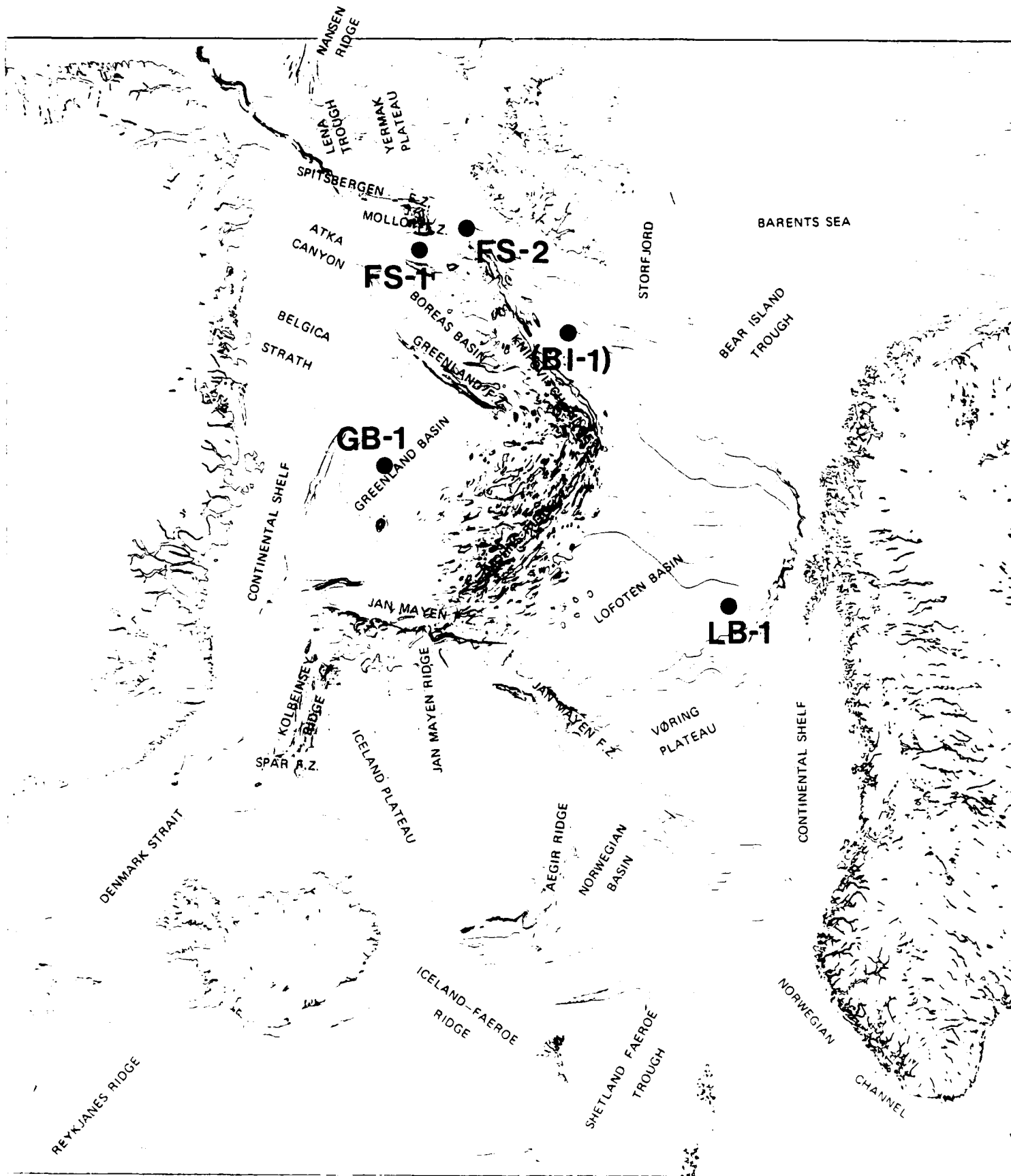
Valdivia: R/V. Valdivia, Hamburg

CM: Current meter

TMM: Transmissometer

DEP: Dissolution experiment package

Figure 1. Distribution of sediment trap/current meter moorings.



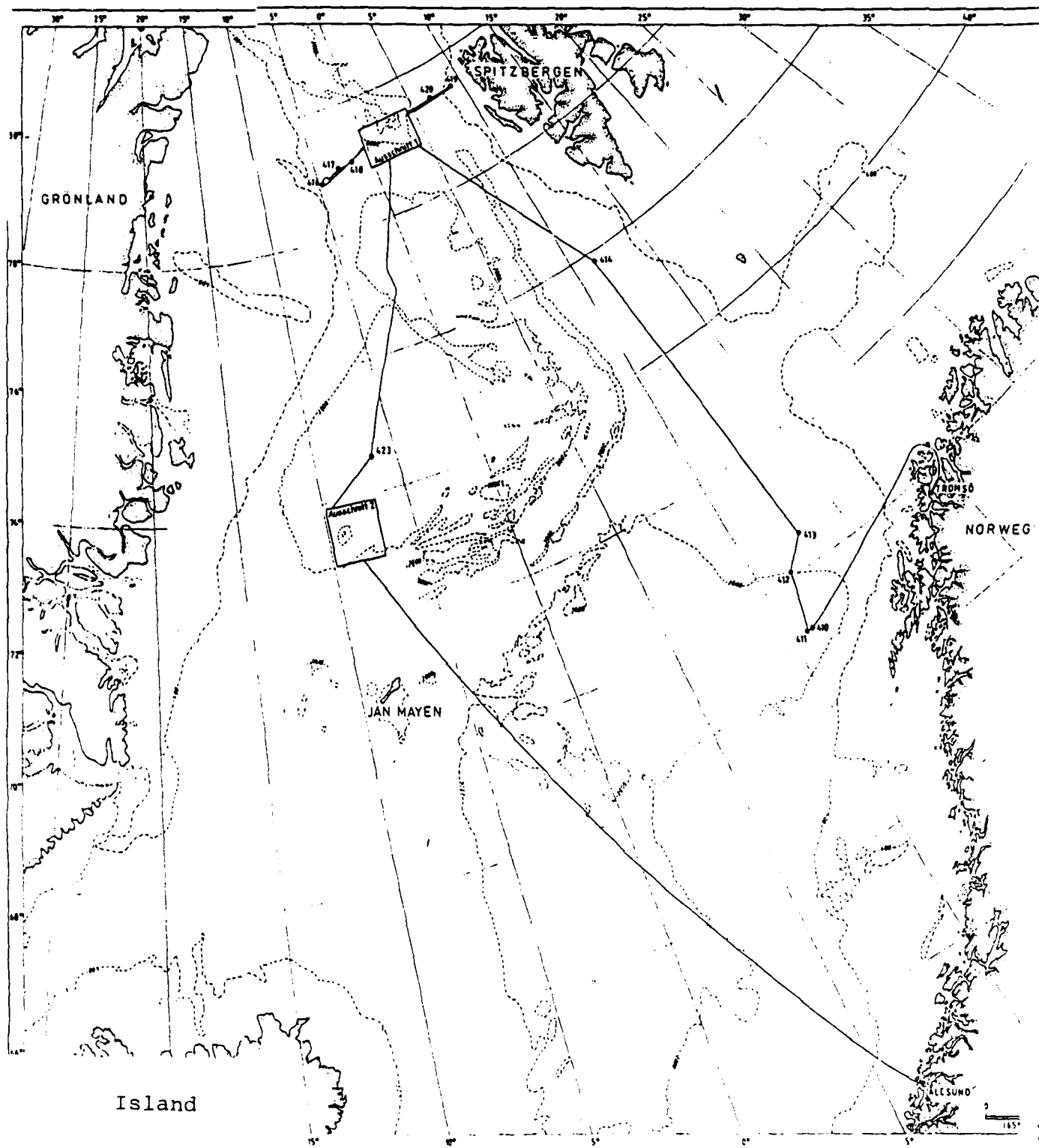


Figure 2. Cruise track of R/V Polarstern, Bremerhaven, from Tromsø to Ålesund, Norway, August 8 to 26, 1984.

1983 - 1984

DATA

Lofoten Basin

Greenland Basin

Current Meter 713

Lofoten Basin

August 11, 1983 - August 15, 1984

60° 30'N

10° 00'E

2,650 meters

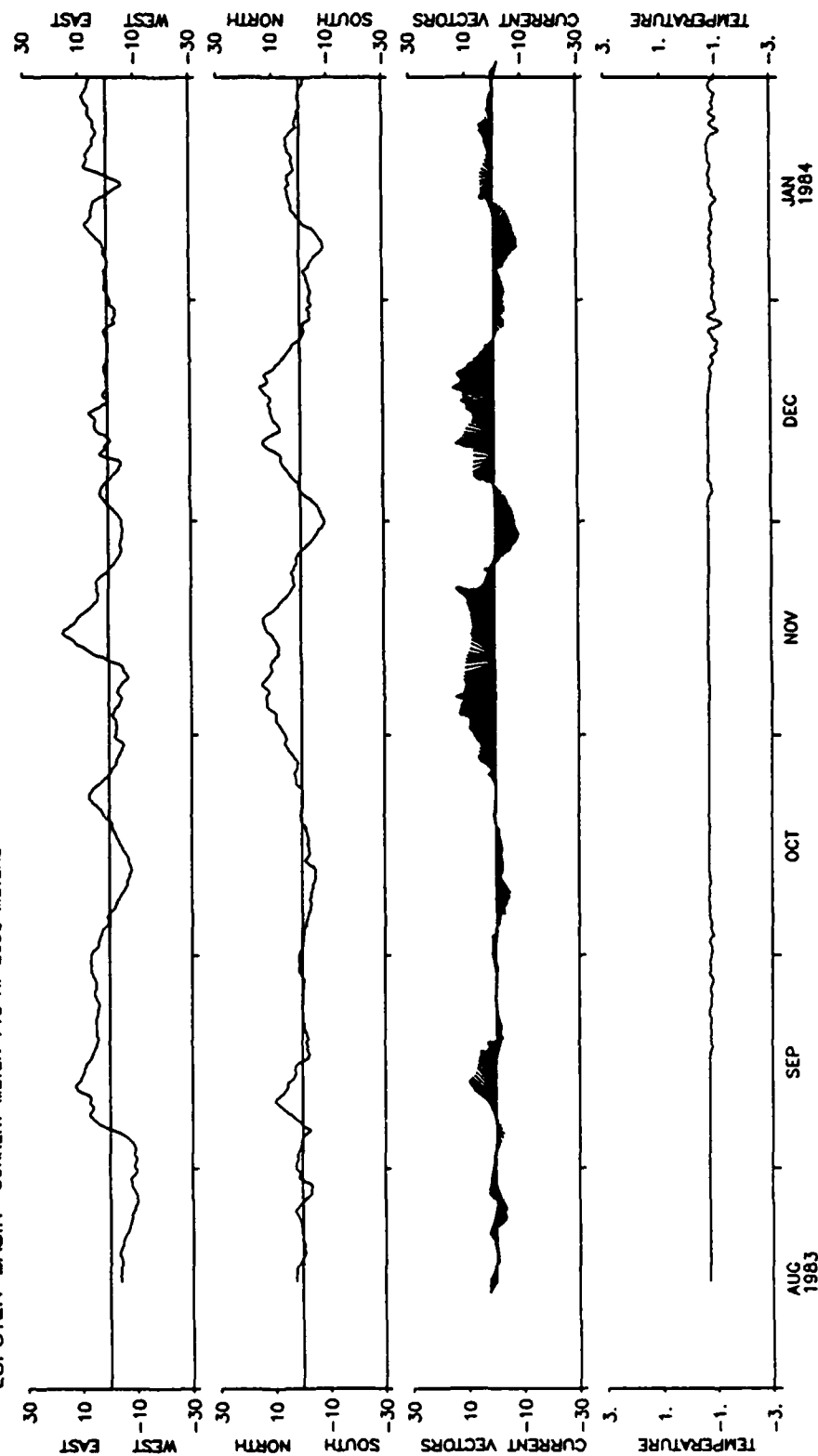
Record length: 8,856 hours

Deployed by R/V Polarstern, Bremerhaven, 08/11/83

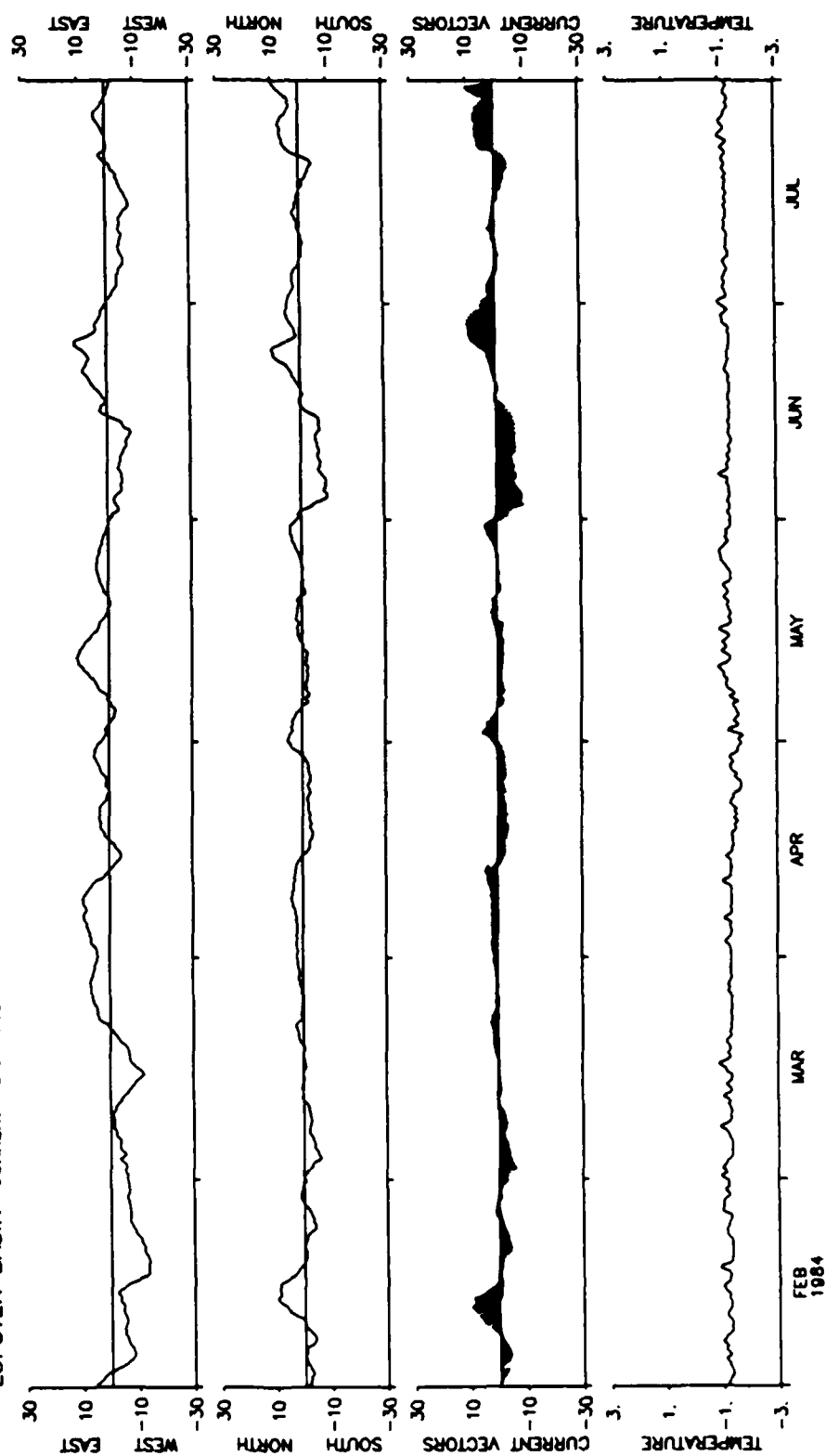
Recovered by R/V Polarstern, Bremerhaven, 08/15/84

Deployed with Mooring LB-1, 1983-84

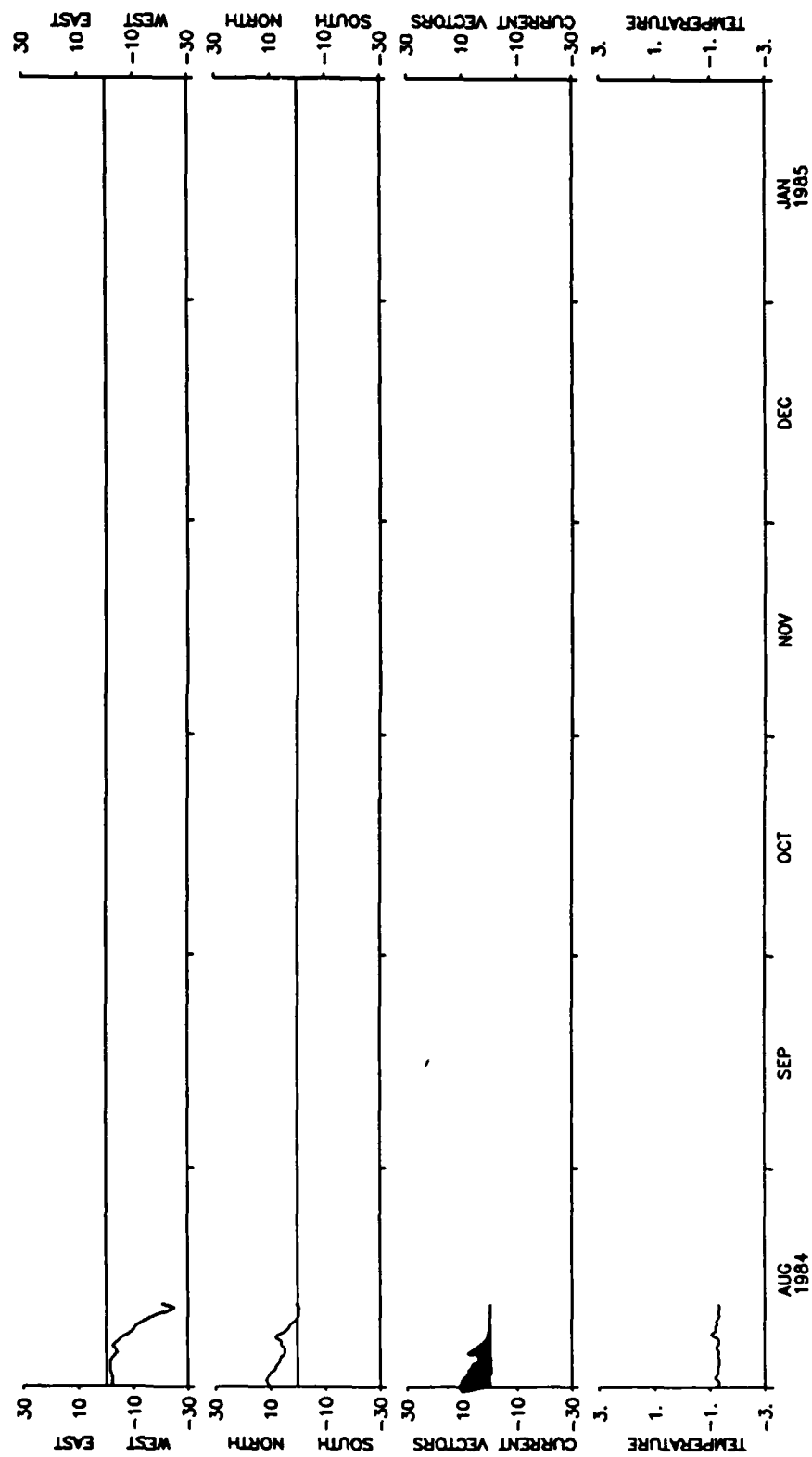
LOFOTEN BASIN CURRENT METER 713 AT 2650 METERS

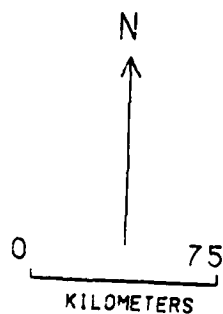


LOFOTEN BASIN CURRENT METER 713 AT 2650 METERS



LOFOTEN BASIN CURRENT METER 713 AT 2650 METERS



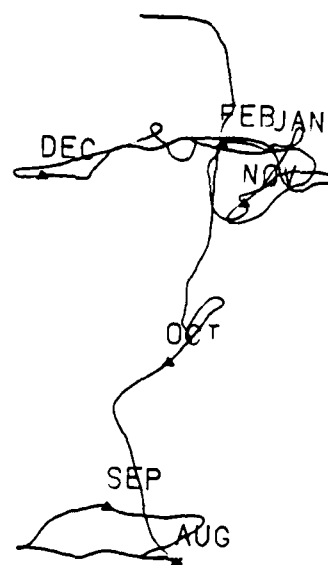


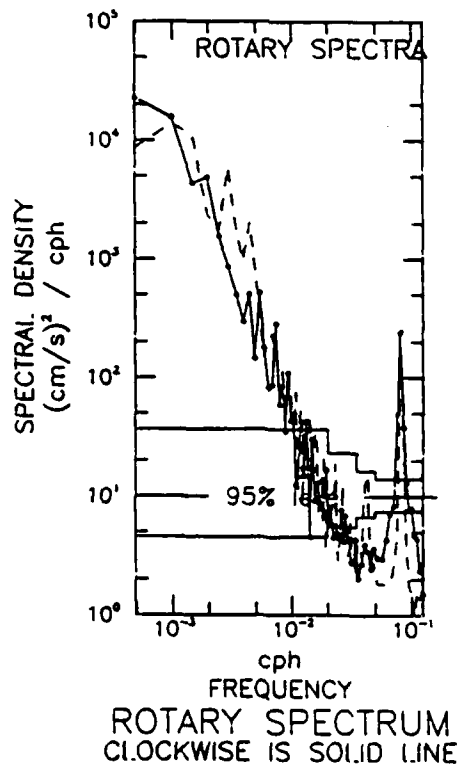
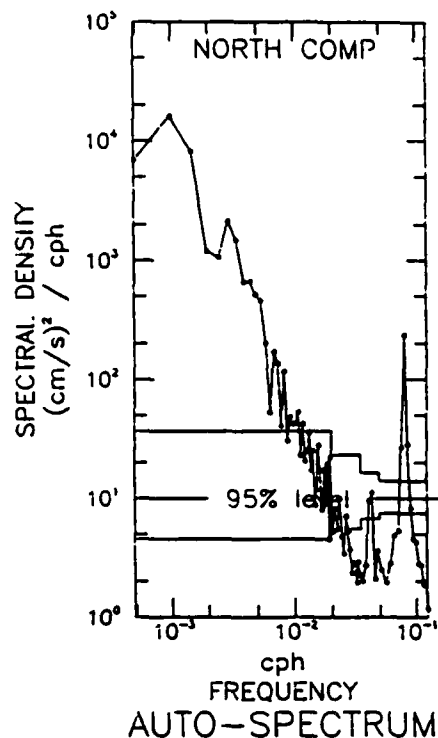
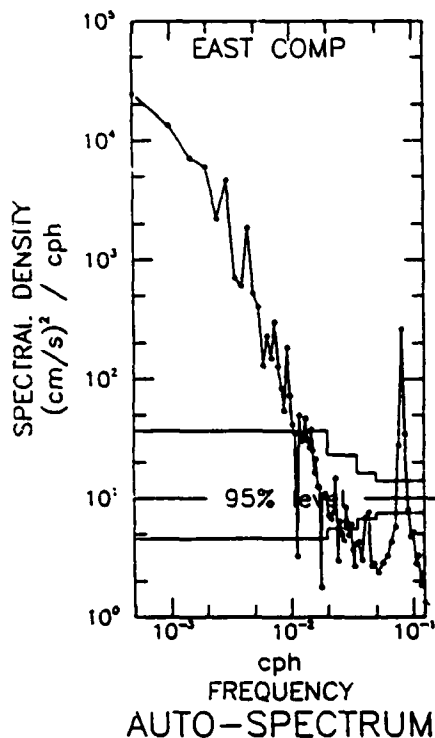
713G

0 #M

83-VIII-16 TO 84- II -13

LB-1, 2,650 m





713

83-84

Current Meter 1484

Greenland Basin

August 1, 1983 - March 12, 1984

74° 32'N

06° 40'W

945 meters

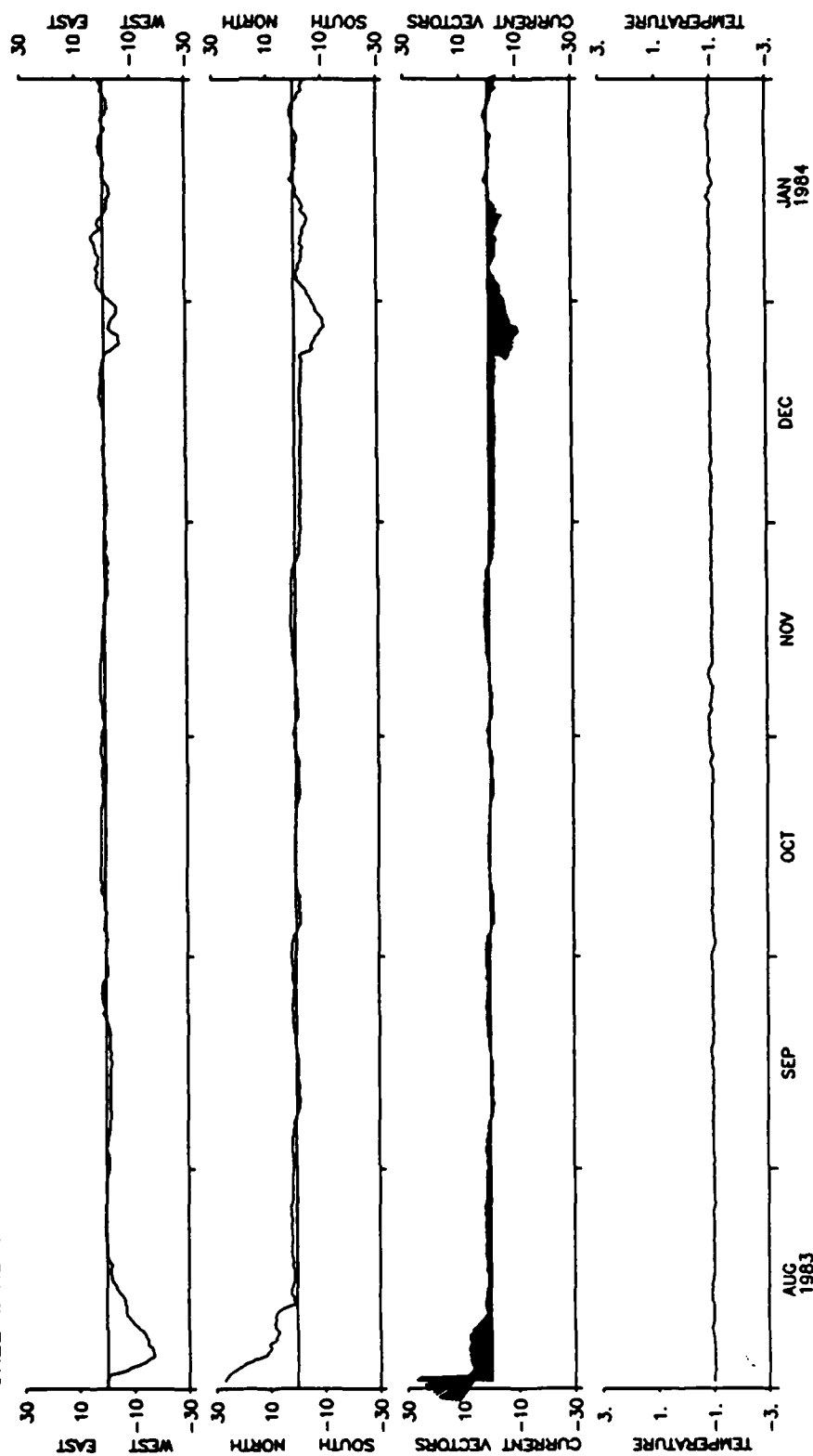
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Recovered by R/V Meteor, Hamburg, 07/30/85

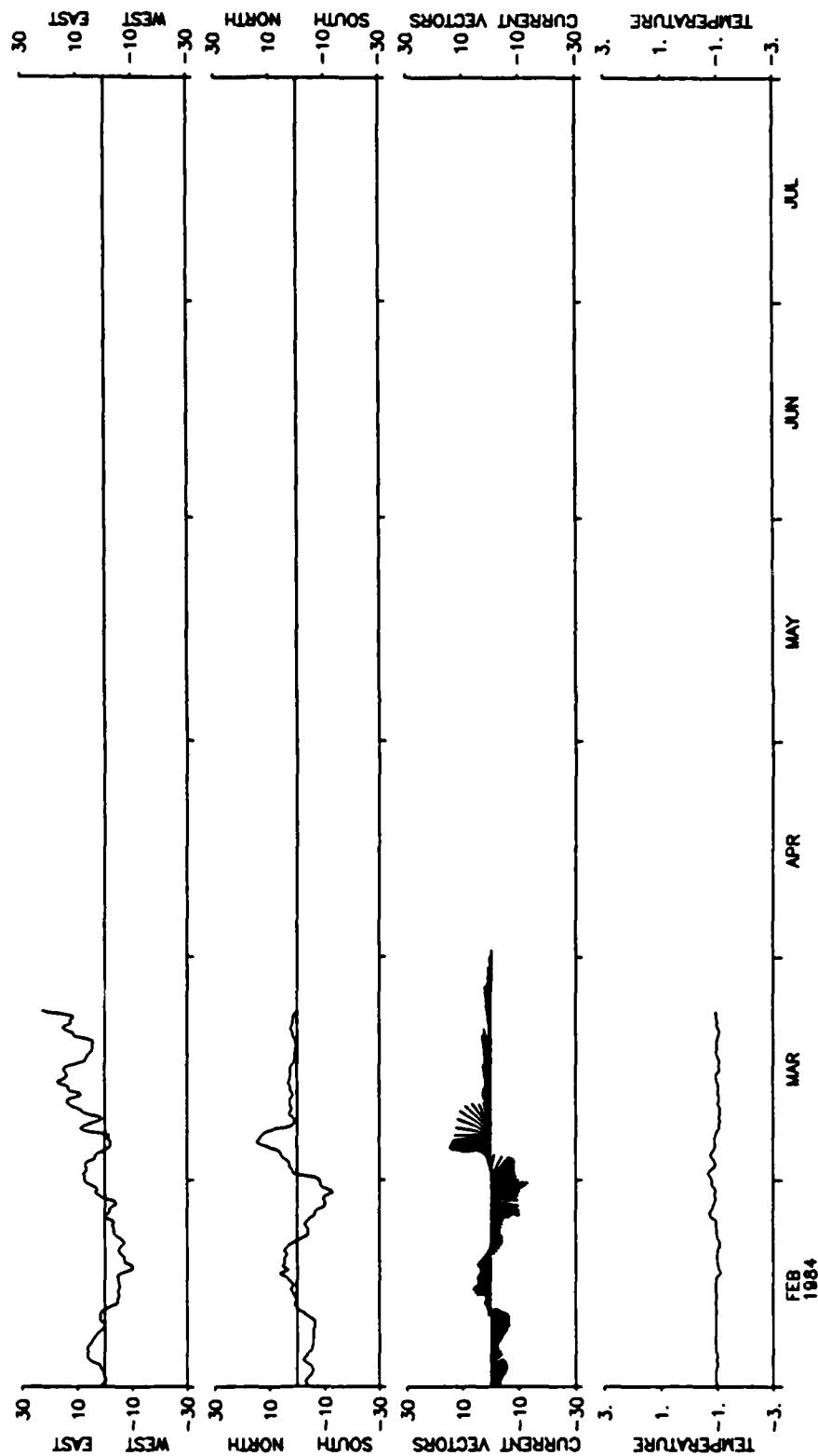
Deployed with Mooring GB-1, 1983-85

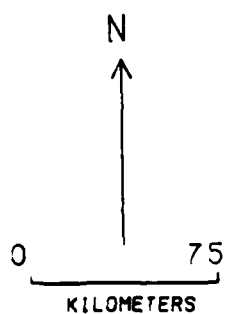
GREENLAND BASIN CURRENT METER 1484 AT 945 METERS



3-77B-87 16.00

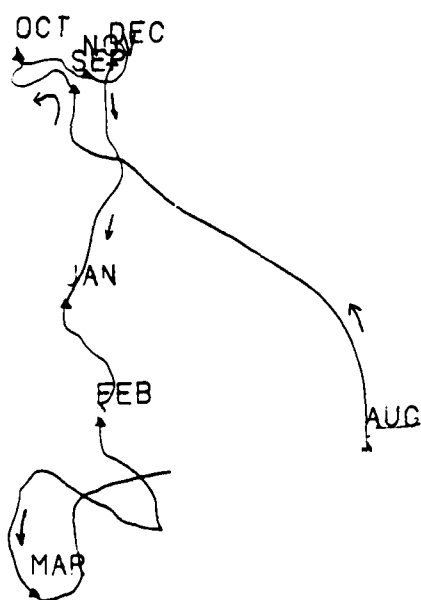
GREENLAND BASIN CURRENT METER 1484 AT 945 METERS

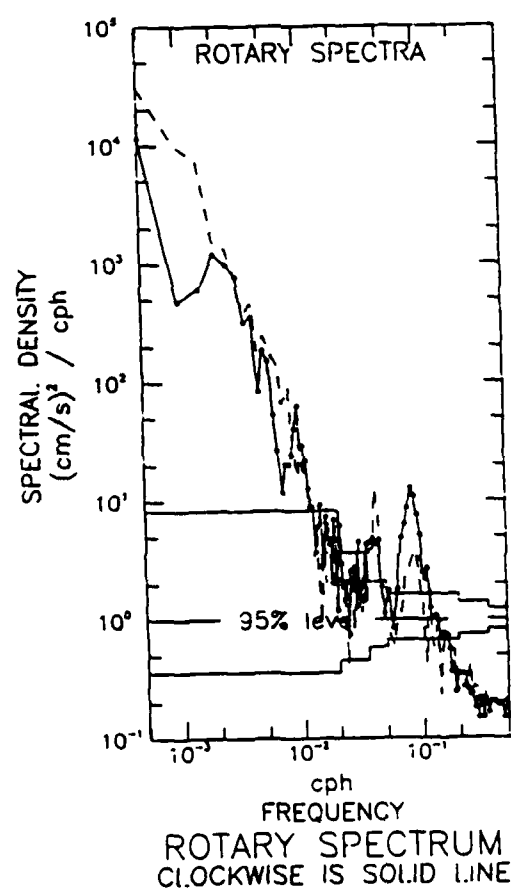
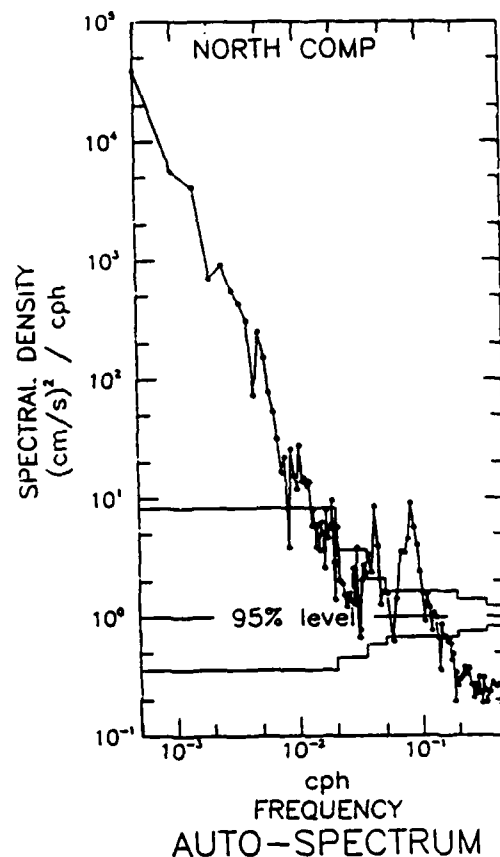
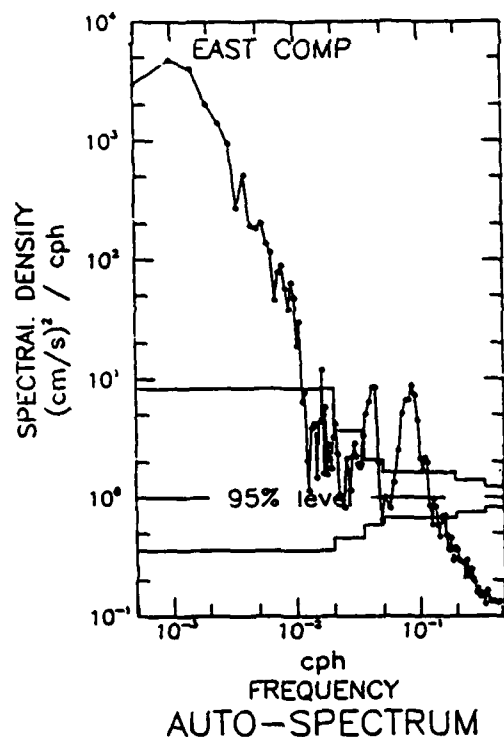




1484G
0 #M
83-VIII-02 TO 84-III-24

GB-1, 945 m





1484

83-84

Current Meter 1485

Greenland Basin

August 1, 1983 - August 22, 1984

74° 32'N

06° 40'W

1,842 meters

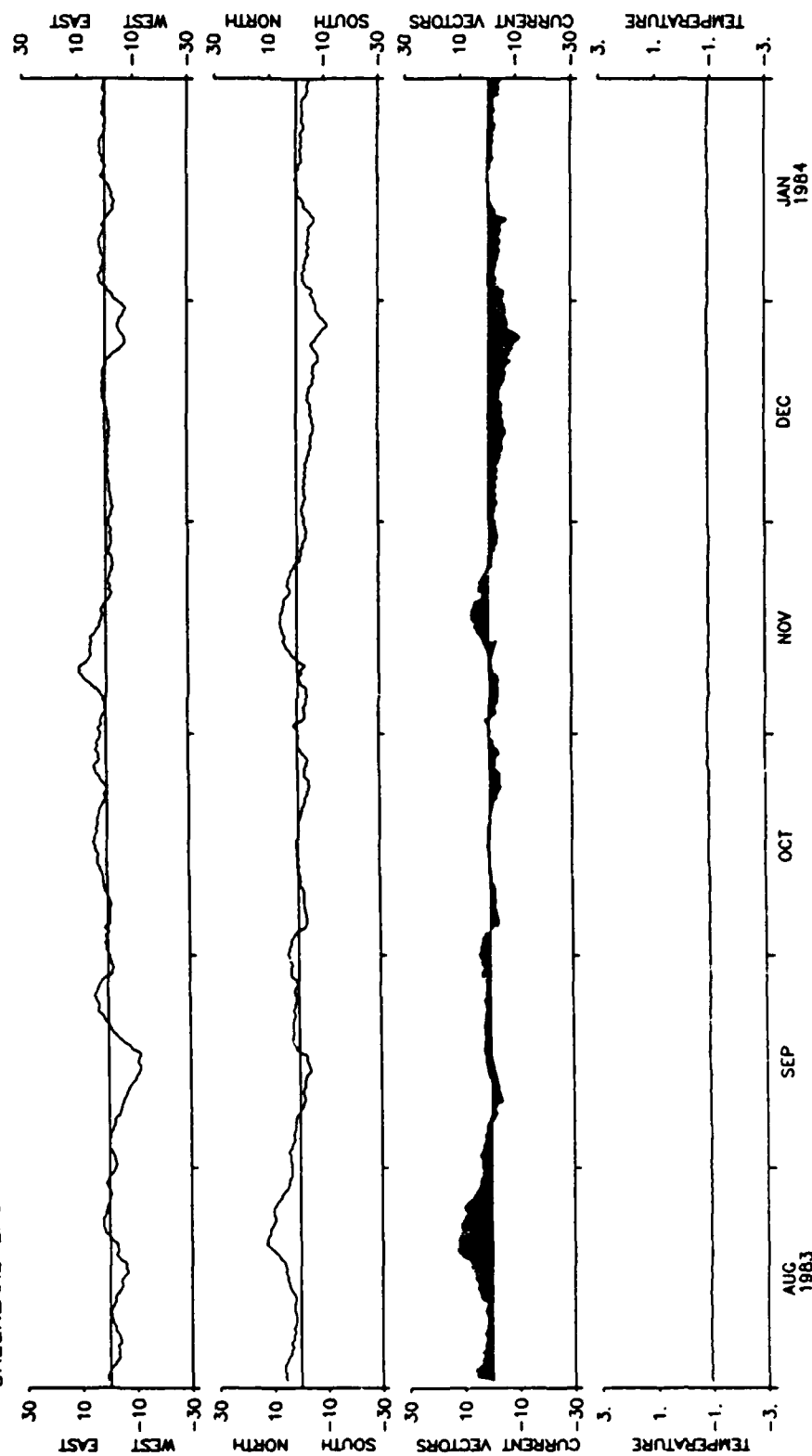
Record length: 9,120 hours

Deployed by R/V Polarstern, Bremerhaven, 08/1/83

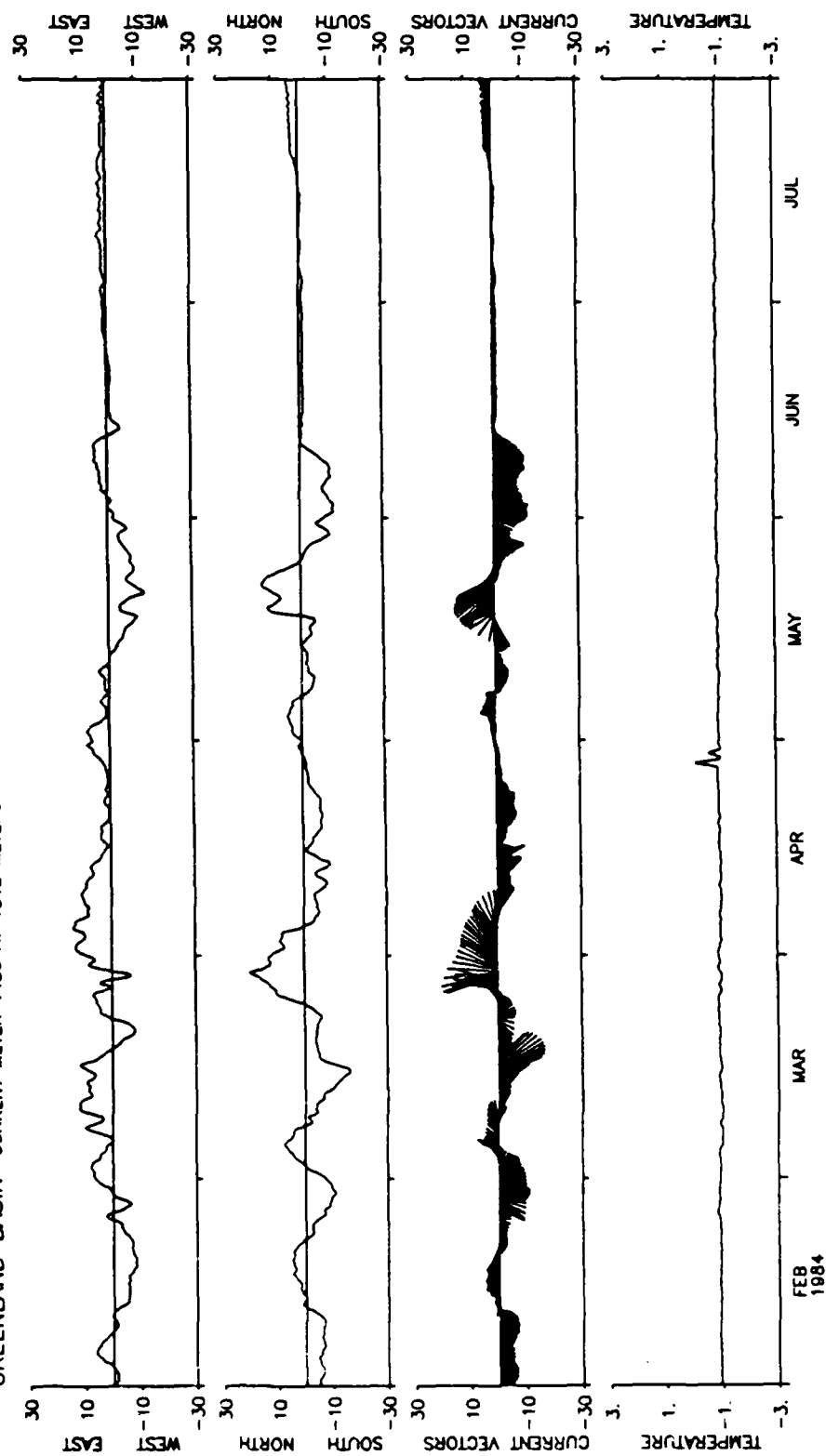
Recovered by R/V Meteor, Hamburg, 07/30/85

Deployed with Mooring GB-1, 1983-85

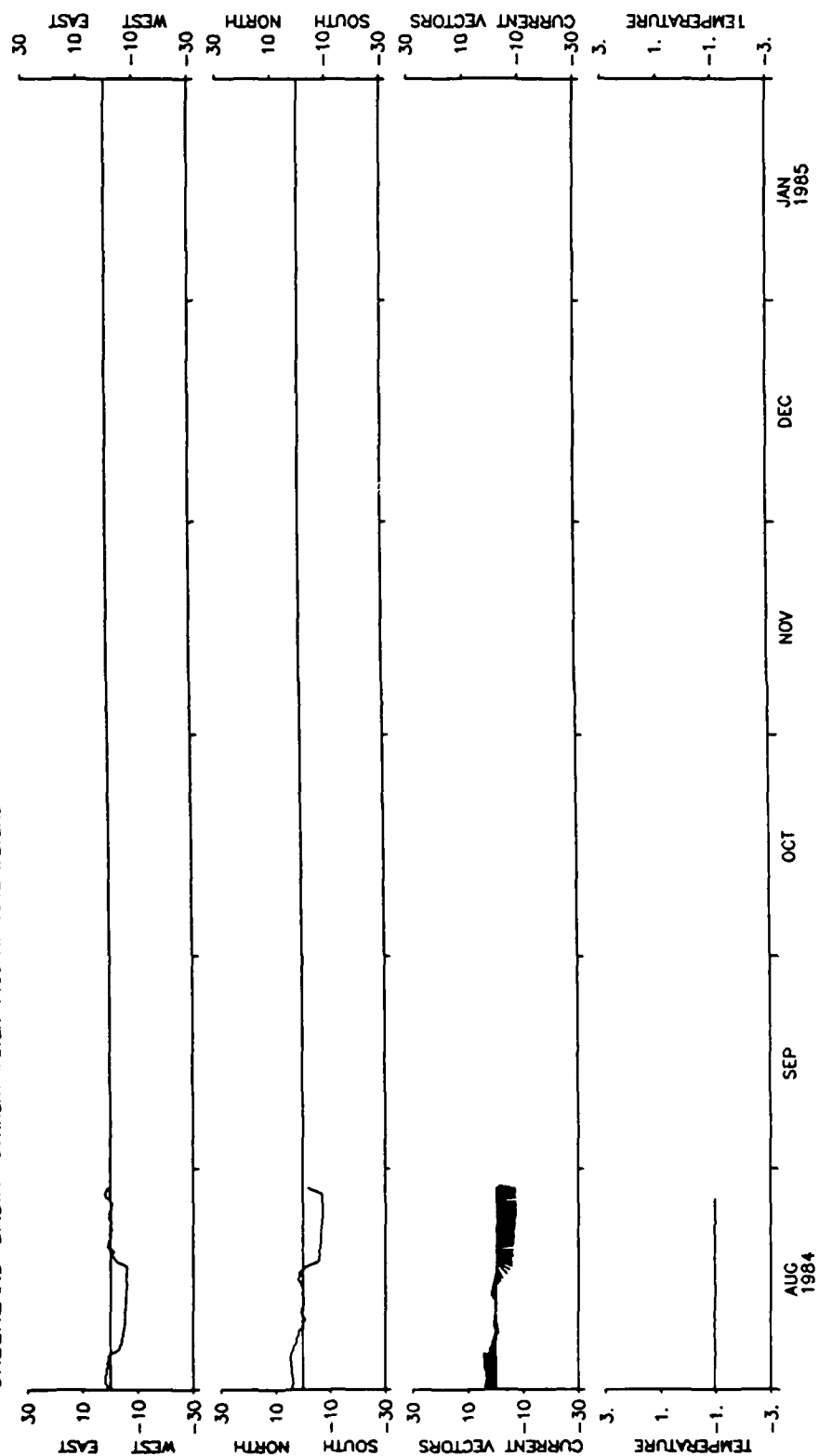
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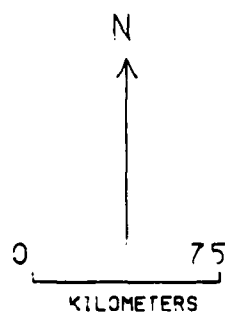


GREENLAND BASIN CURRENT METER 1485 AT 1842 METERS



GREENLAND BASIN CURRENT METER 1485 AT 1842 METERS



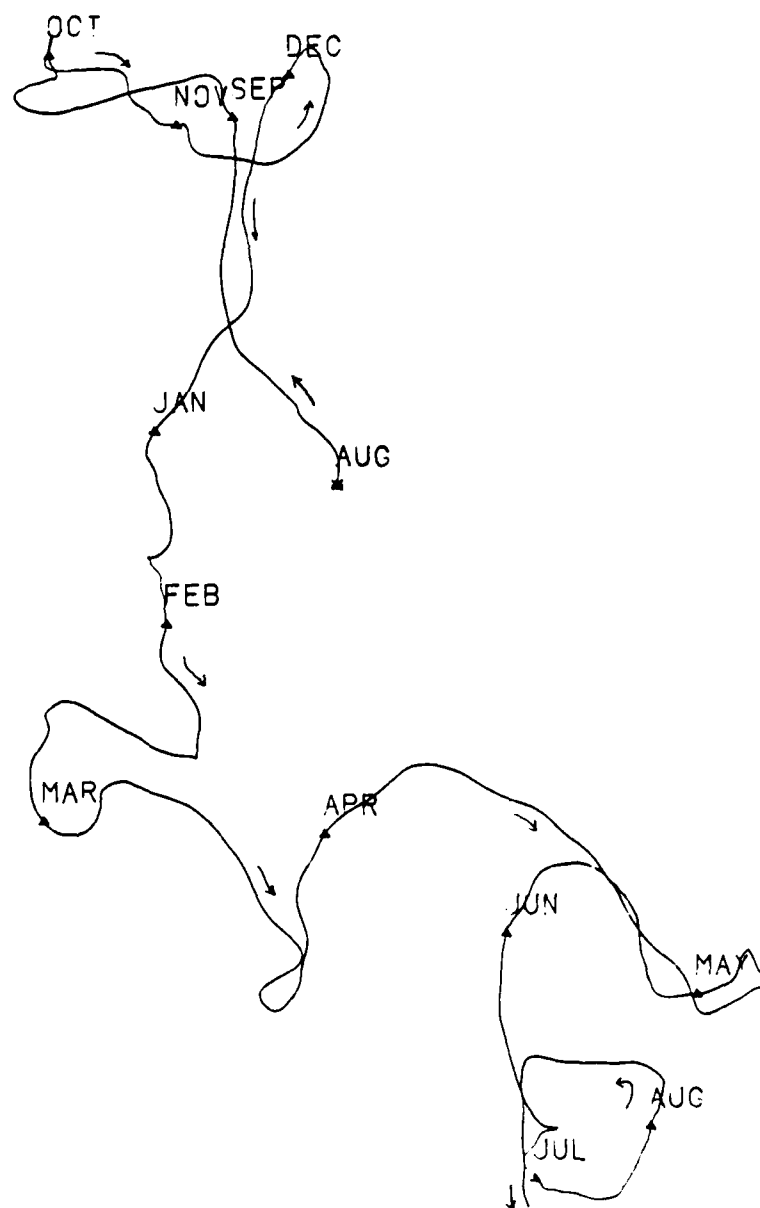


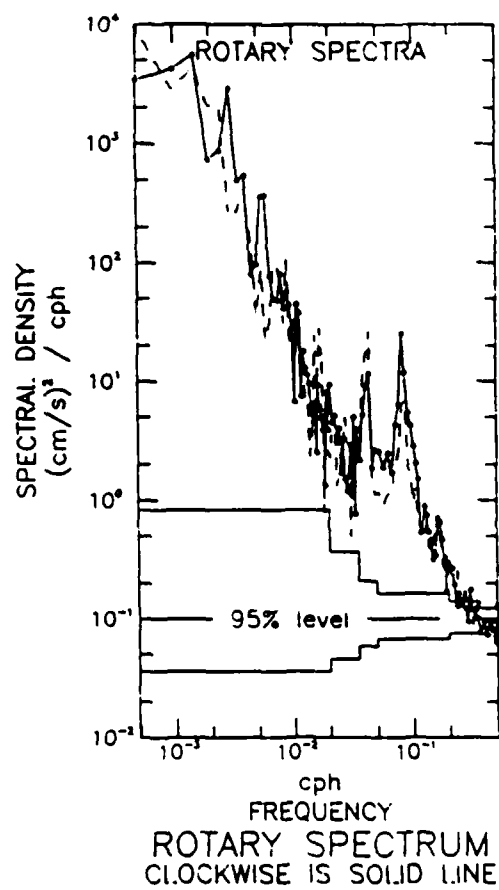
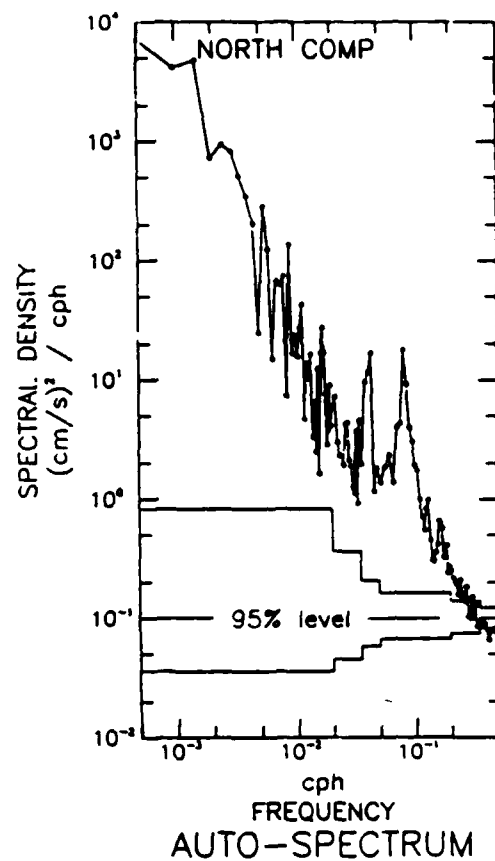
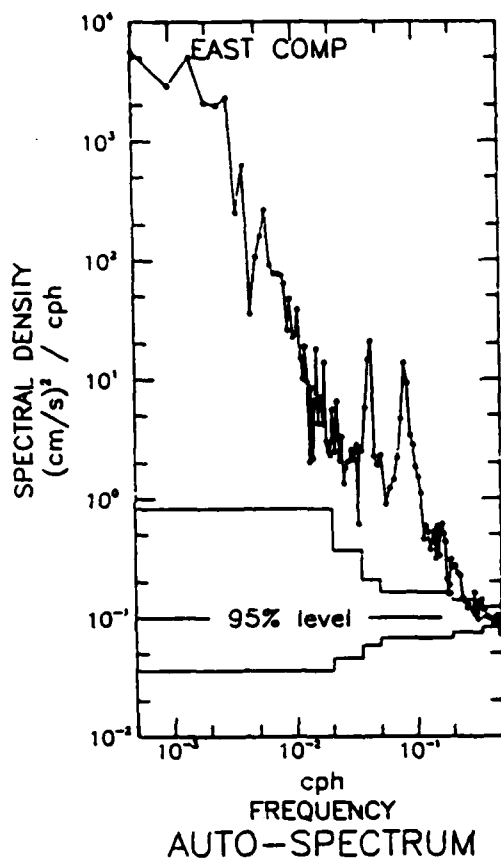
1485G

0 #M

83-VIII-02 TO 84-VIII-29

GB-1, 1,842 m





1485

83-84

Current Meter 2752

Greenland Basin

August 1, 1983 - September 27, 1984

74° 32'N

06° 40'W

2,929 meters

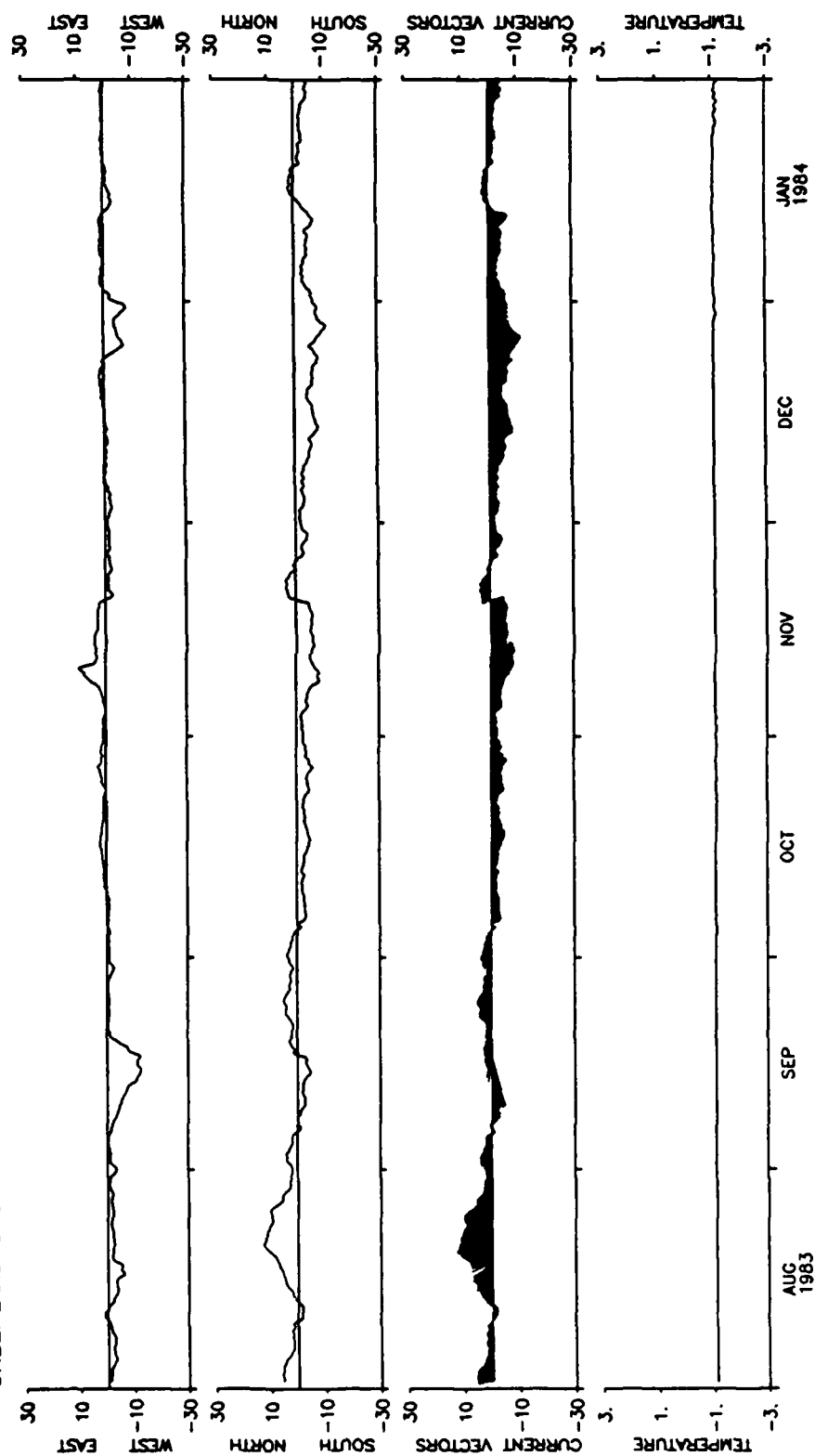
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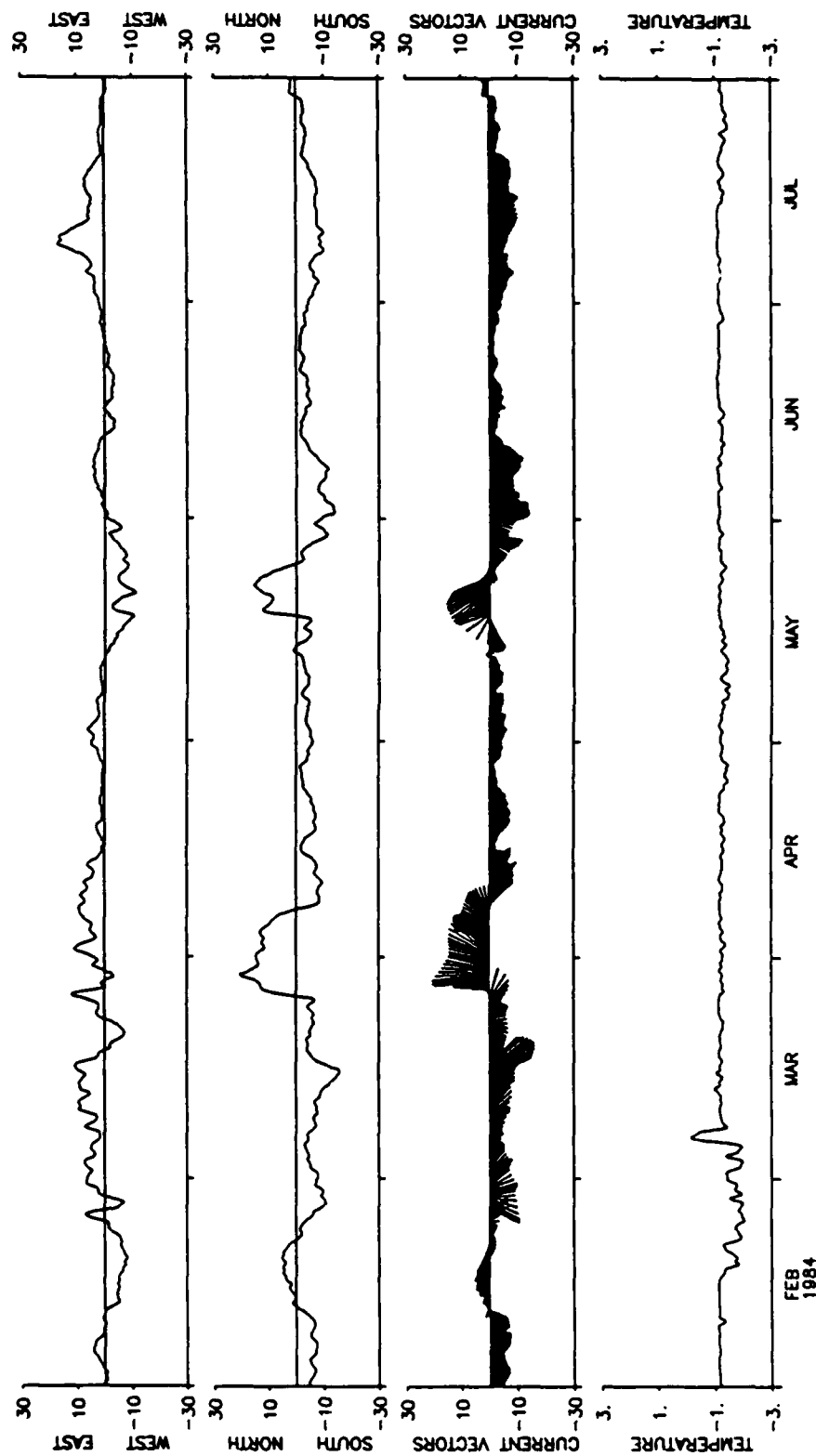
Deployed with Mooring GB-1, 1983-85

GREENLAND BASIN CURRENT METER 2752 AT 2929 METERS

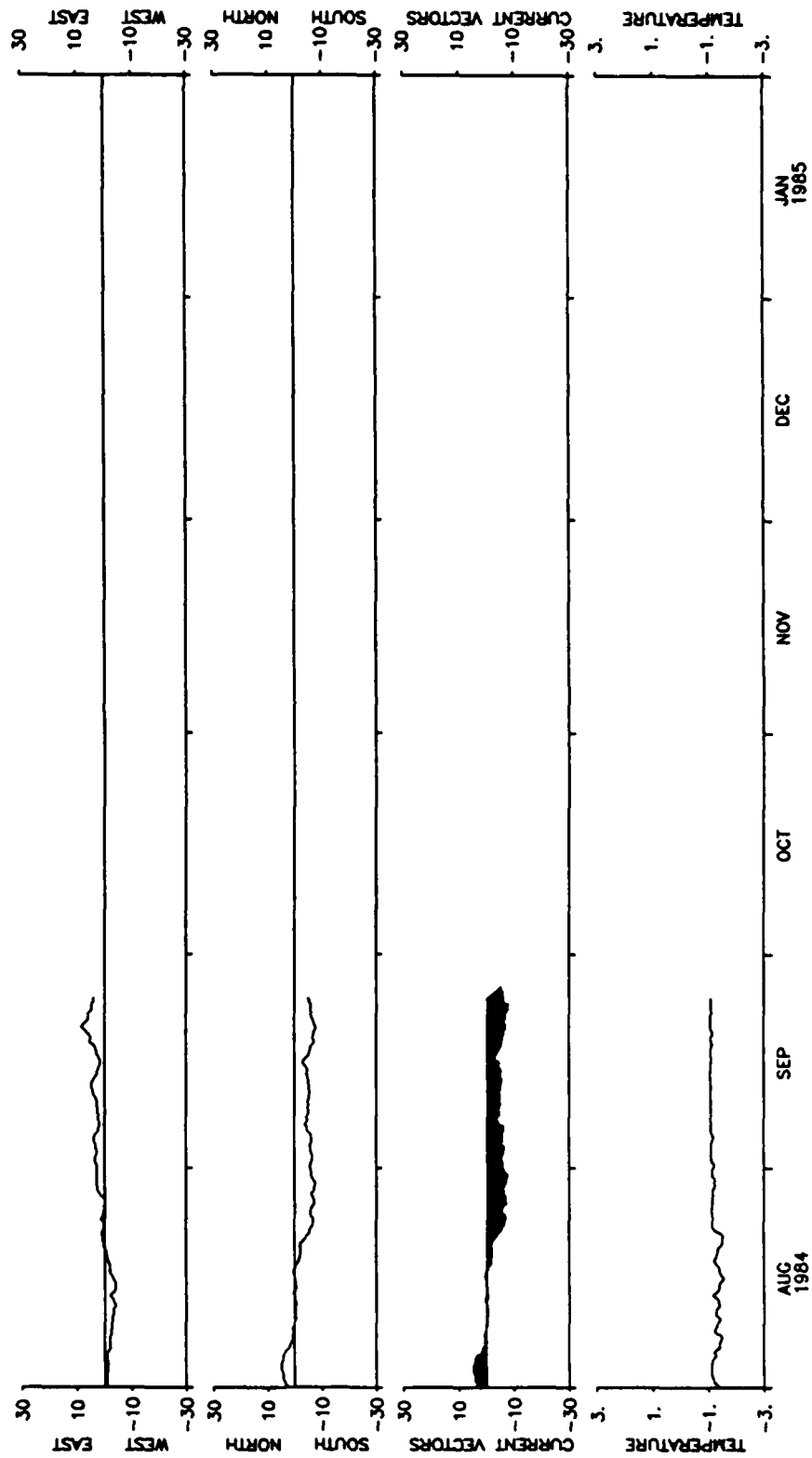


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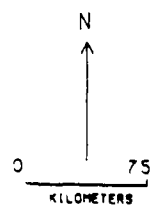
GREENLAND BASIN CURRENT METER 2752 AT 2929 METERS



GREENLAND BASIN CURRENT METER 2752 AT 2929 METERS

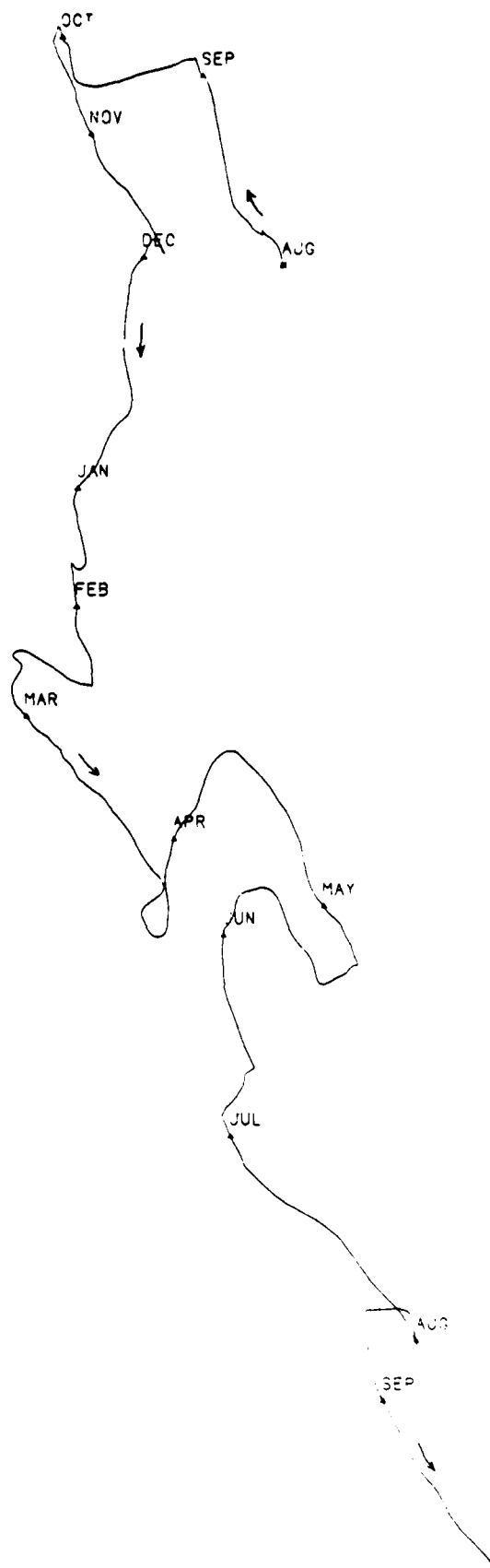


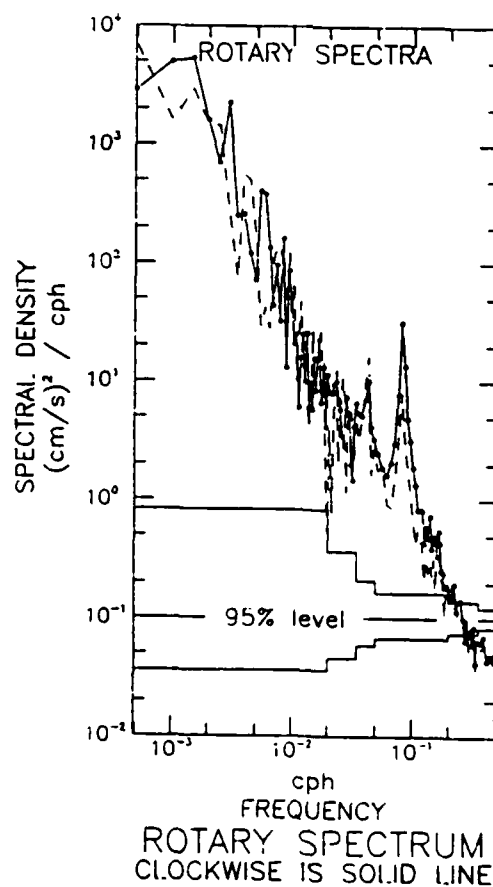
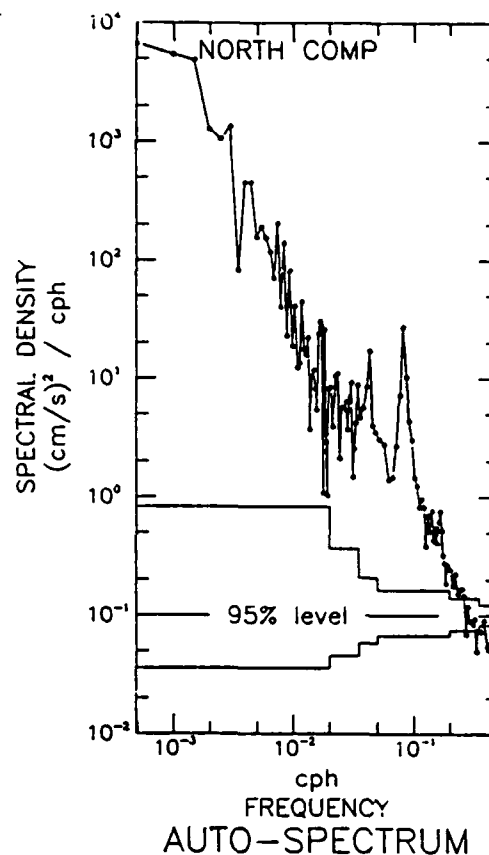
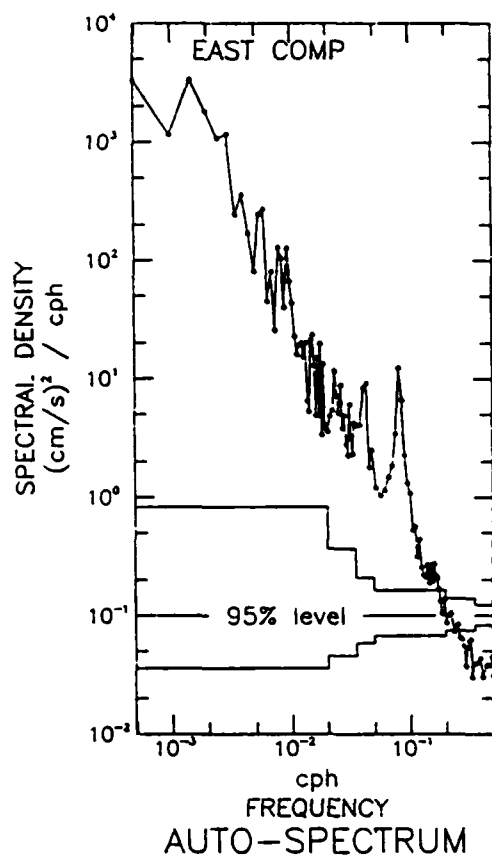
3-703-07 14.20



2752G
0 8M
83-VIII-02 TO 84-IX-24

GB-1, 2,926 m





2752
83-84

Greenland Basin

1983 - 1984

Vector Diagram

Three-dimensional plots

August 1, 1983 - July 30, 1984

945 m, #1484

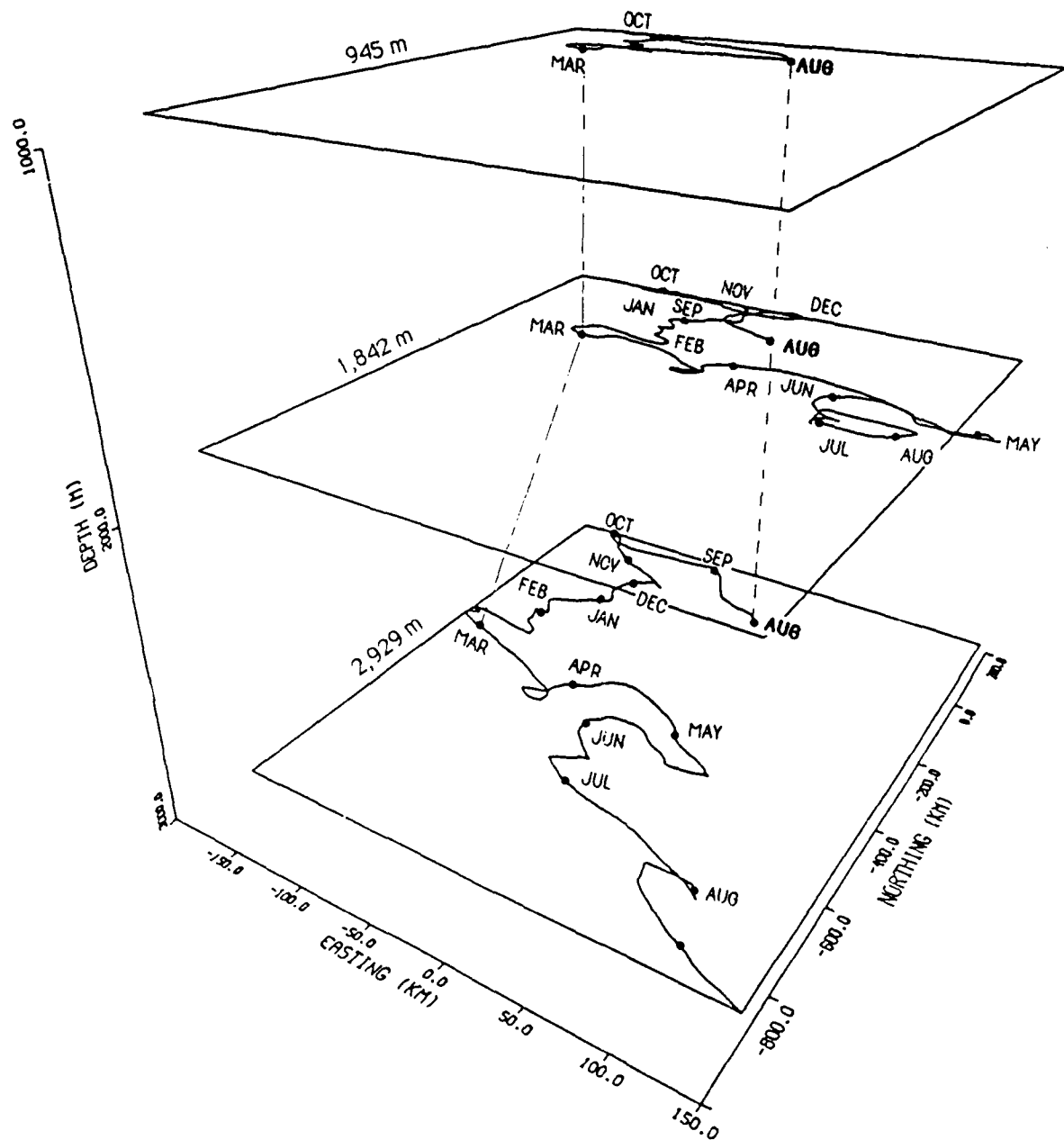
1,842 m, #1485

2,929 m, #2752

VECTOR DIAGRAM
GREENLAND BASIN, GB-1
74 32'N, 06 40'W

AUGUST, 1983 - AUGUST 1984

Anchor depth: 3,417 m



1984 - 1985

DATA

Fram Strait

Greenland Basin

Current Meter 2814

Fram Strait

August 20, 1984 - August 10, 1985

78° 52'N

01° 22'E

2,476 meters

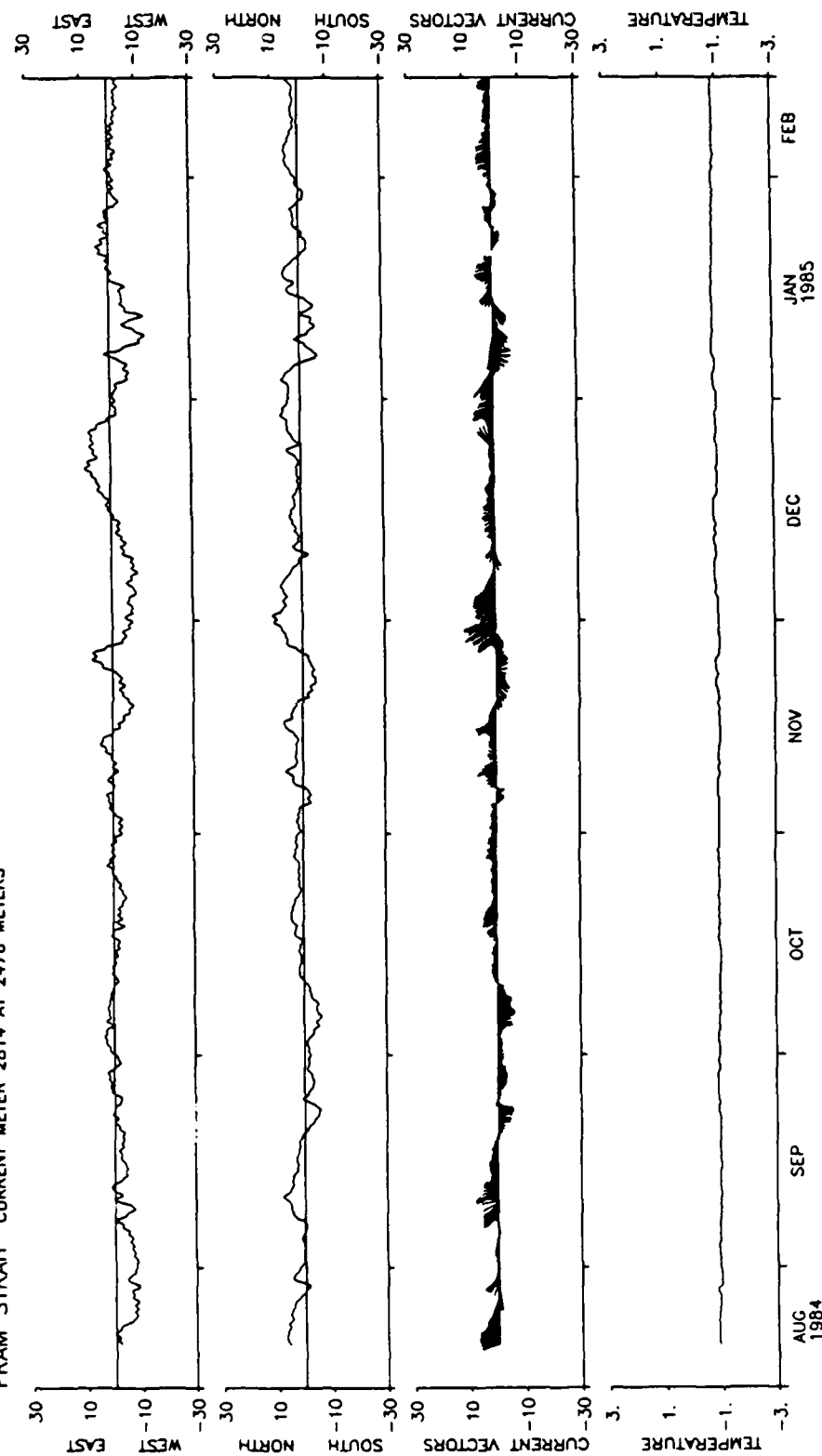
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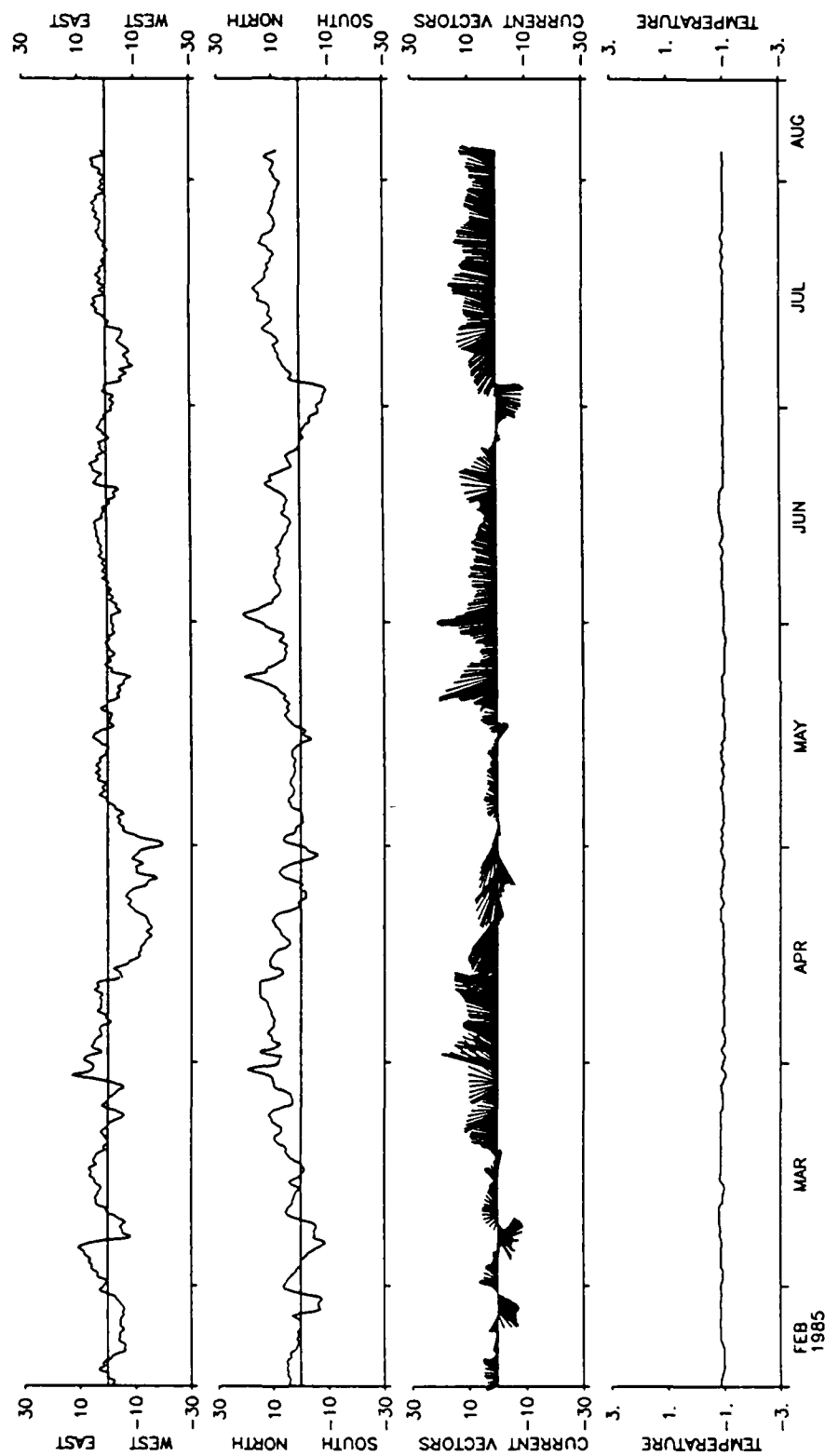
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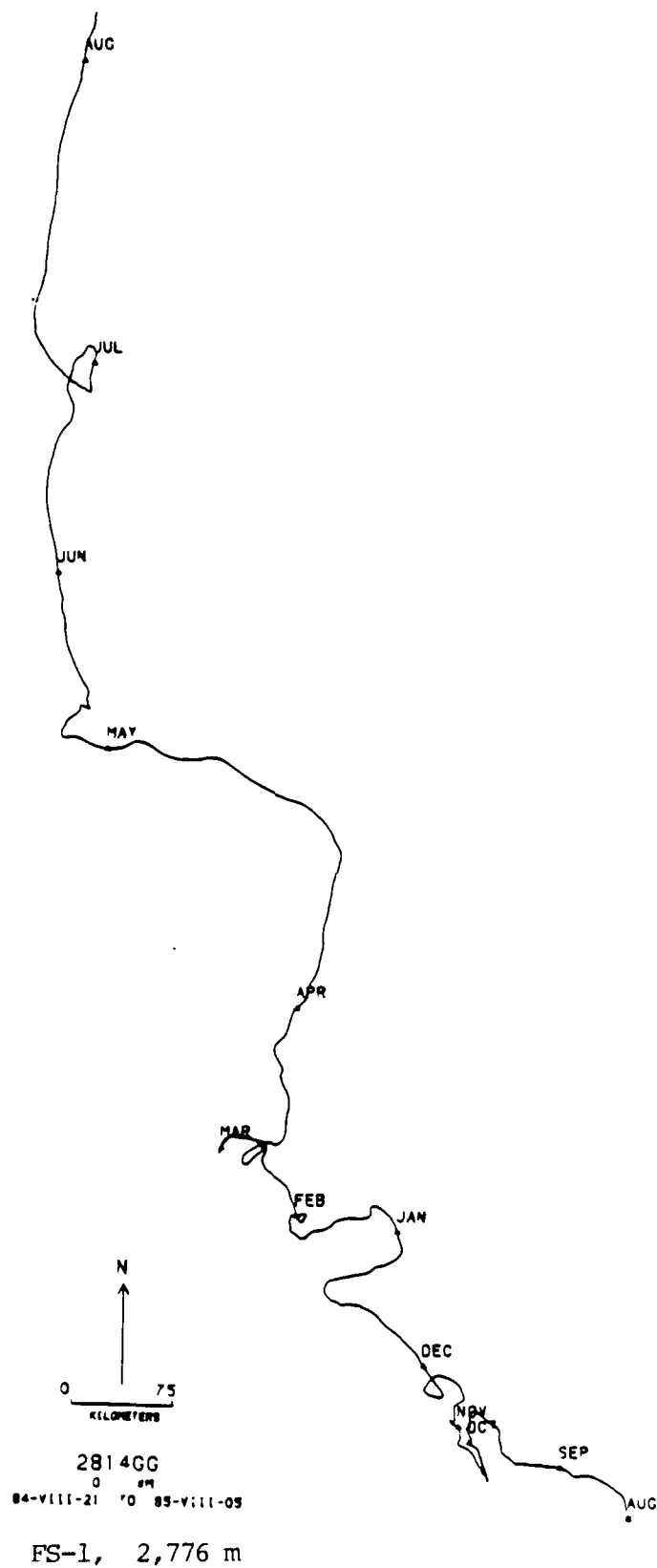
Deployed with Mooring FS-1, 1984-85

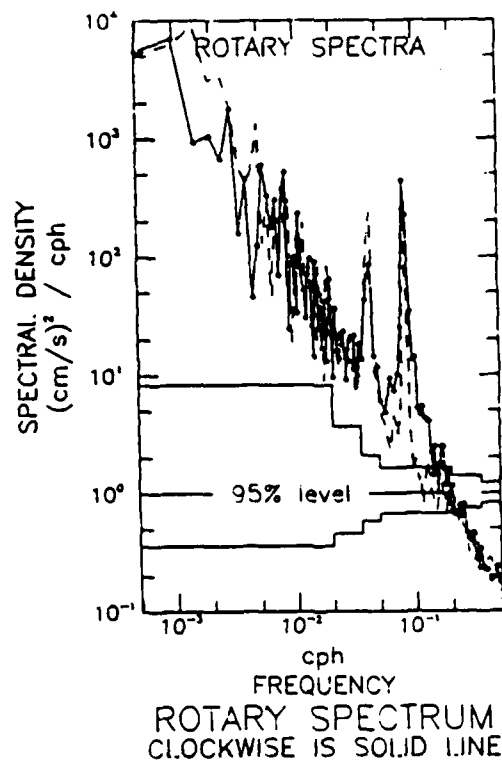
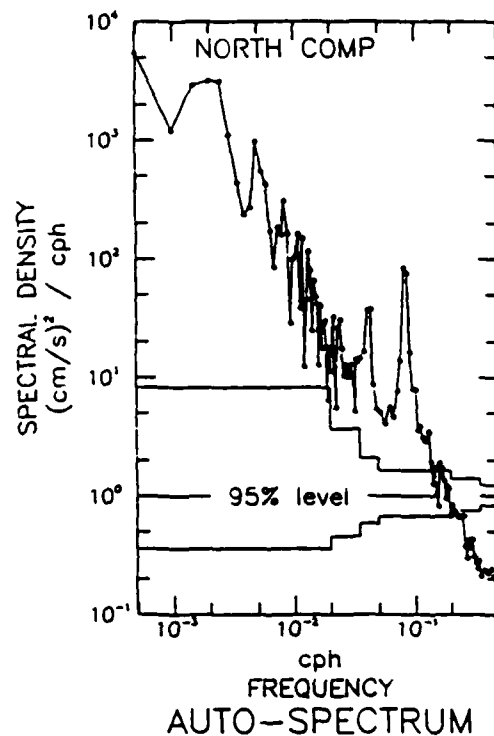
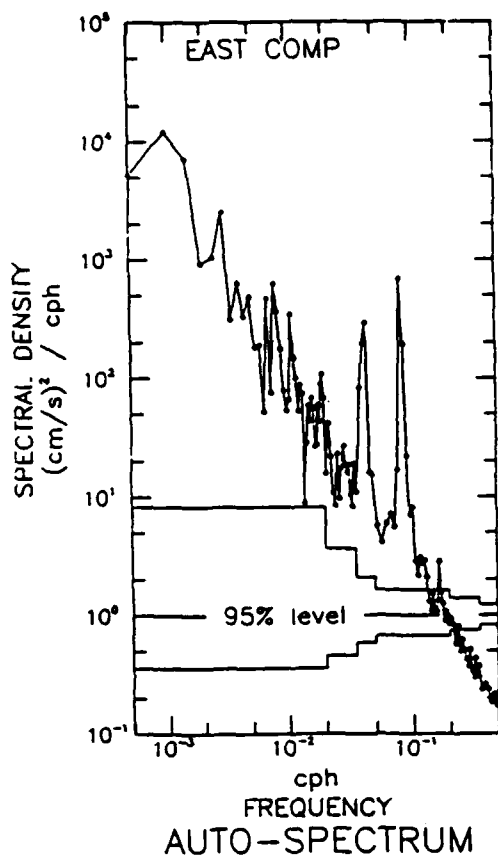
FRAM STRAIT CURRENT METER 2814 AT 2476 METERS



FRAM STRAIT CURRENT METER 2814 AT 2476 METERS







2814

84-85

1985 - 1986

DATA

Fram Strait

Current Meter 2814

Fram Strait

78° 52'N

01° 22'E

2,476 meters

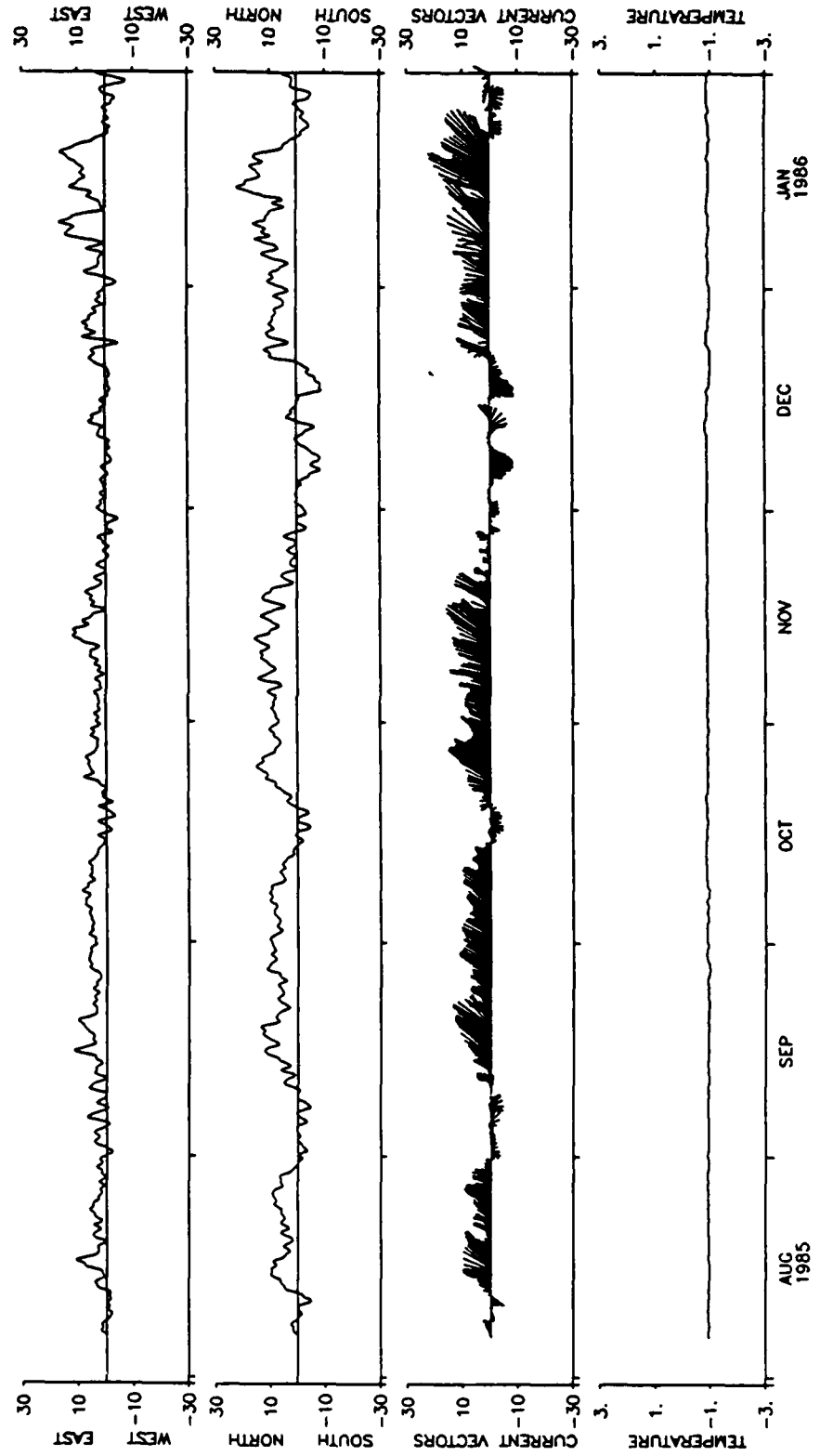
Record length: 8,686 hours

Deployed by R/V Polarstern, Bremerhaven

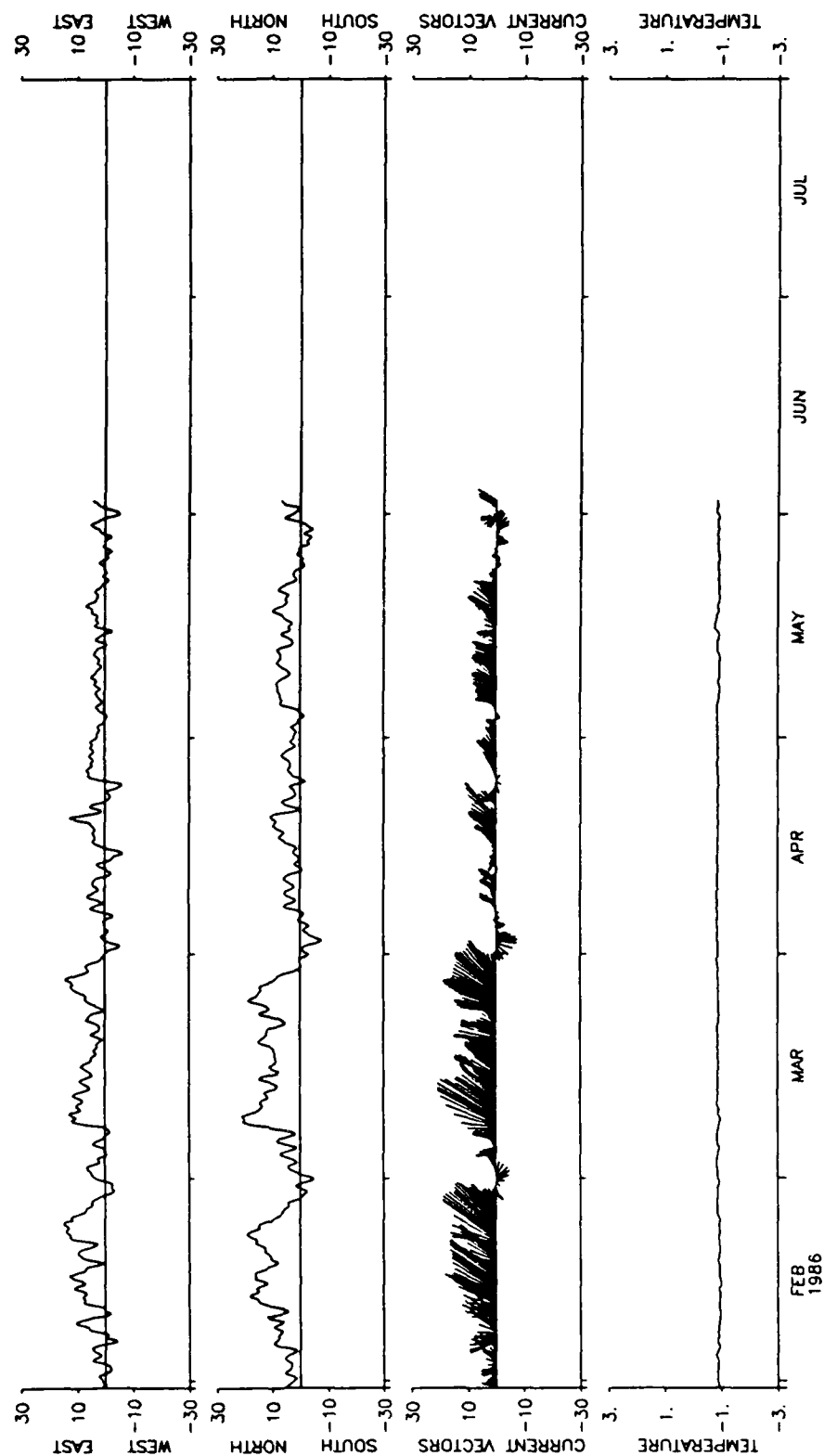
Recovered by R/V Valdivia, Hamburg

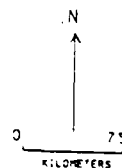
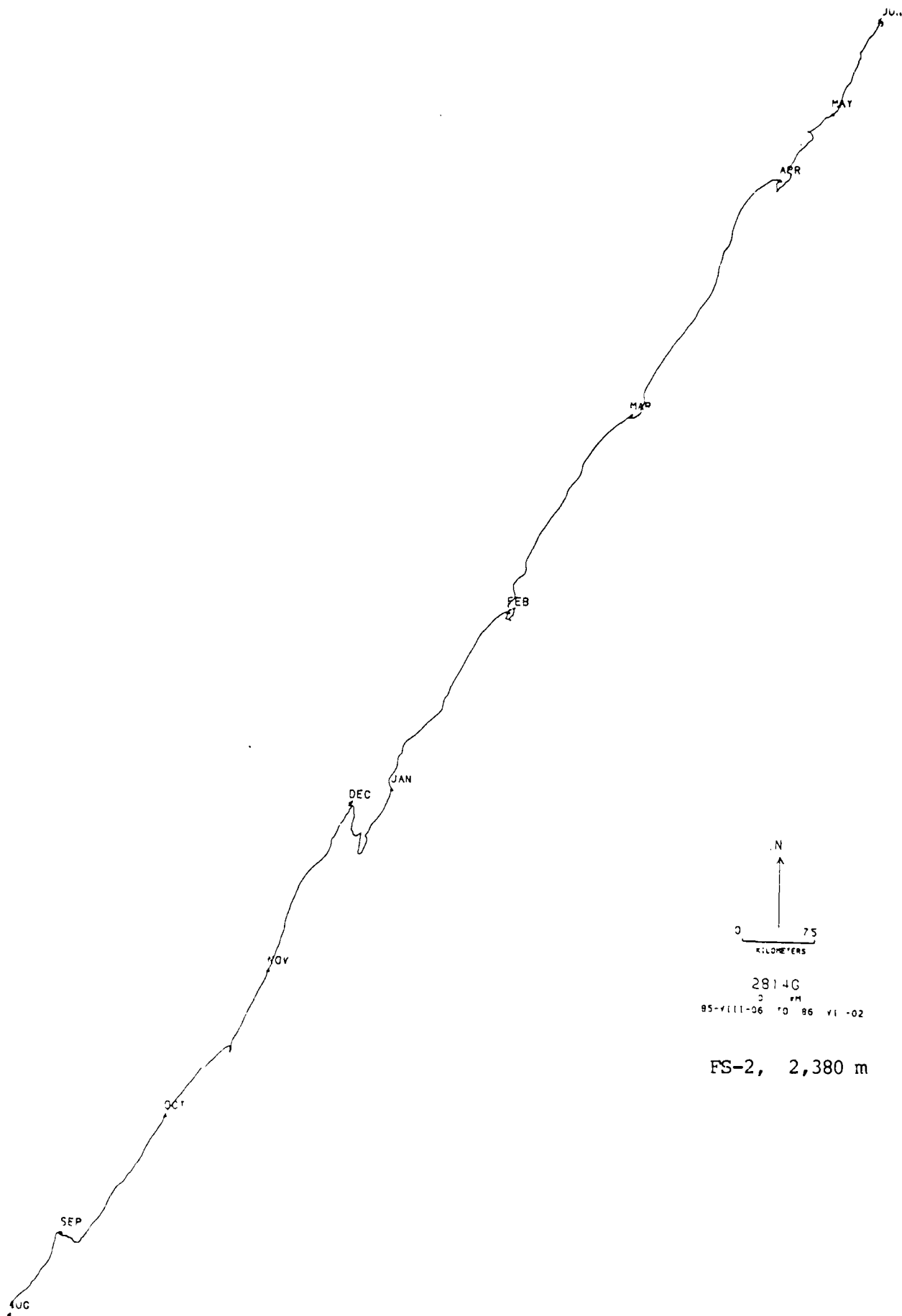
Deployed with Mooring FS-2, 1985-86

FRAM STRAIT CURRENT METER 2814 AT 2380 METERS



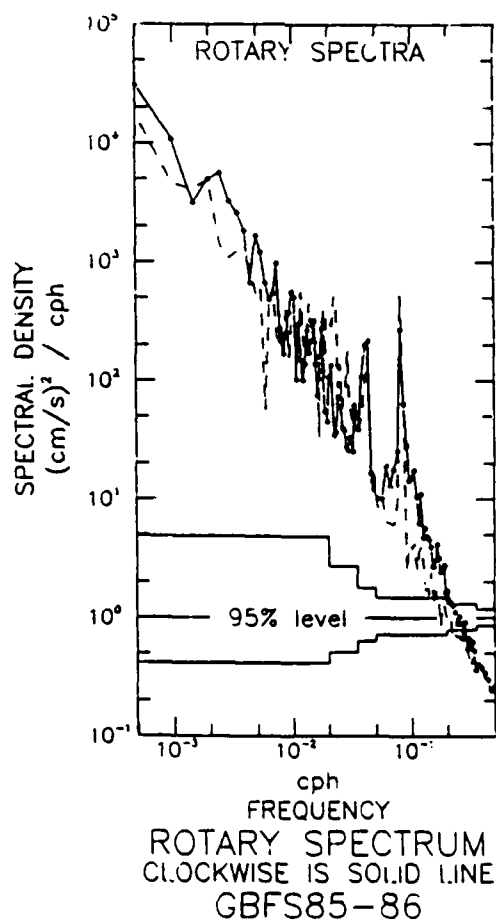
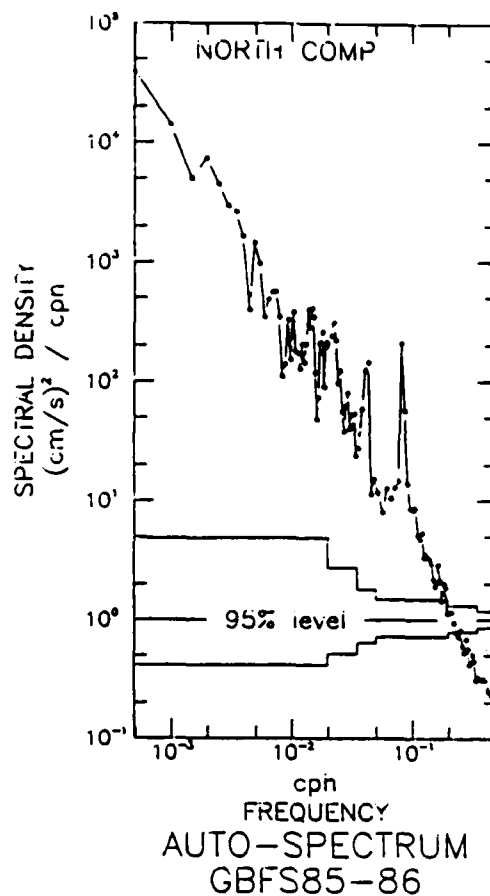
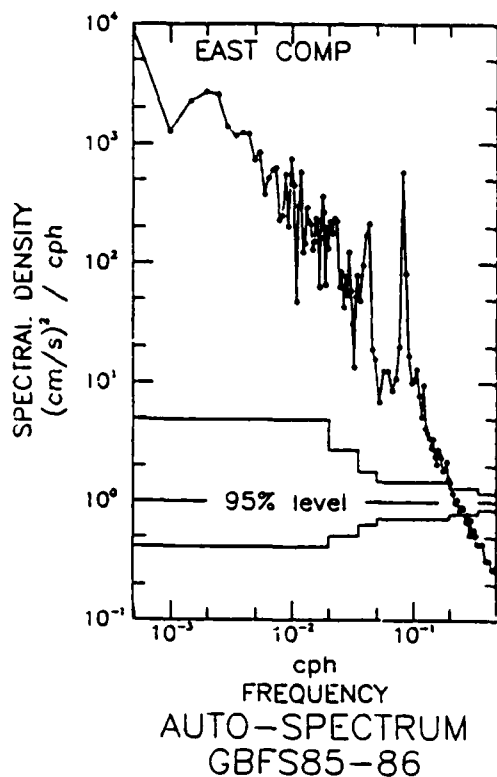
FRAM STRAIT CURRENT METER 2814 AT 2380 METERS





2814G
0 PM
95-VIII-06 '0 86 VI -02

FS-2, 2,380 m



2814

Current Meter 1484

Greenland Basin

August 1, 1985 - March 20, 1986

74° 35'N

06° 43'W

980 meters

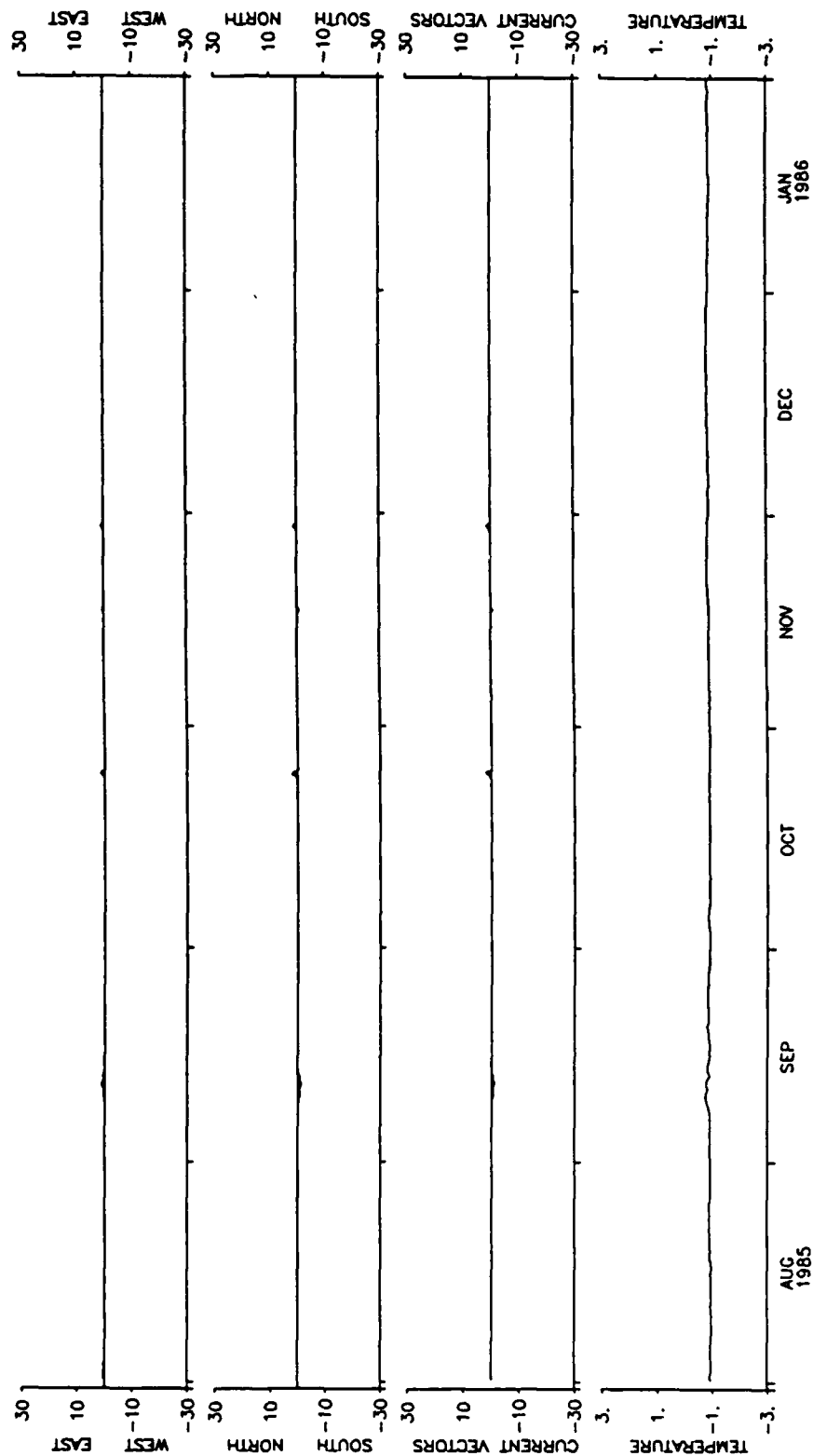
Record length: (partial)

Deployed by R/V Meteor, Hamburg, 08/02/85

Recovered by R/V Valdivia, Hamberg, 08/23/86

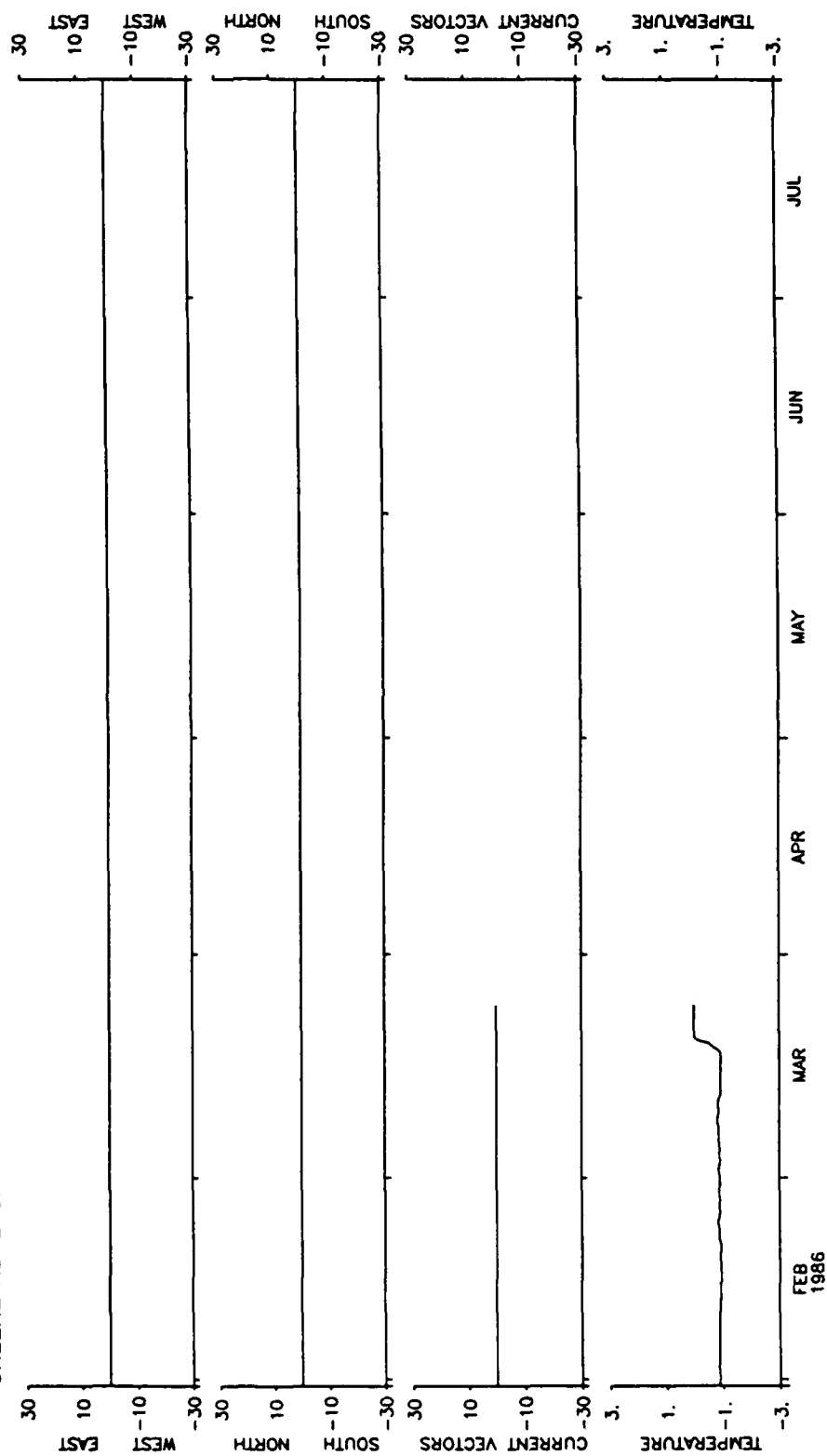
Deployed with Mooring GB-2, 1985-86

GREENLAND BASIN CURRENT METER 1484 AT 960 METERS

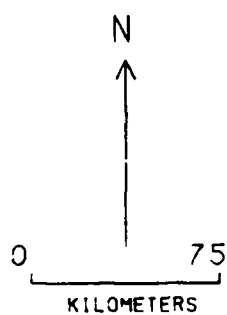


16-FEB-87 11:30

GREENLAND BASIN CURRENT METER 1484 AT 960 METERS



0-FEB-87 11:40



1484G

0 #M

85-VIII-01 TO 86-III-24

GB-2, 1,857 m

858

Current Meter 1485

Greenland Basin

August 1, 1985 - August 20, 1986

74° 35'N

06° 43'W

1,857 meters

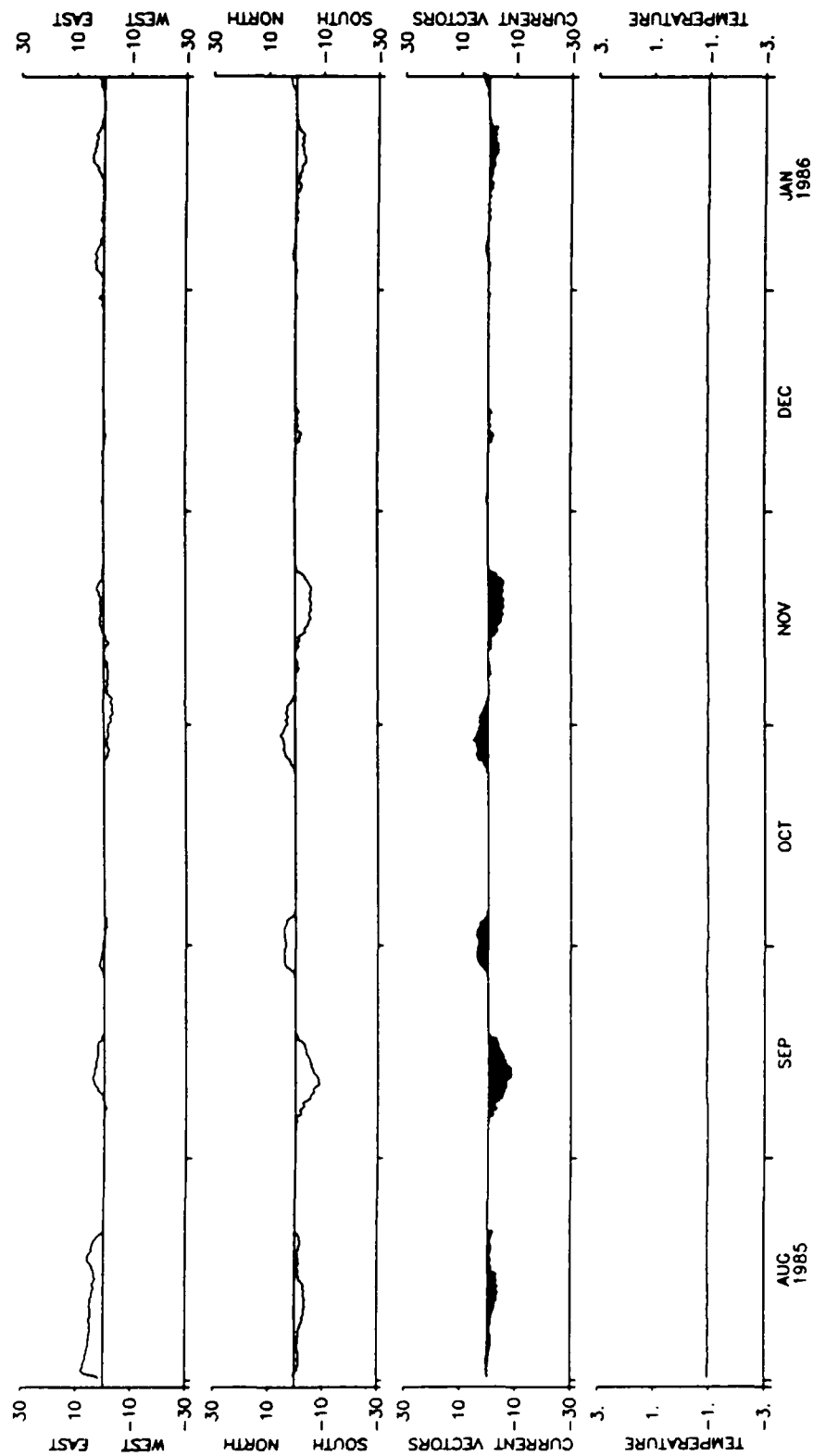
Record length: 8,688

Deployed by R/V Meteor, Hamburg, 08/02/85

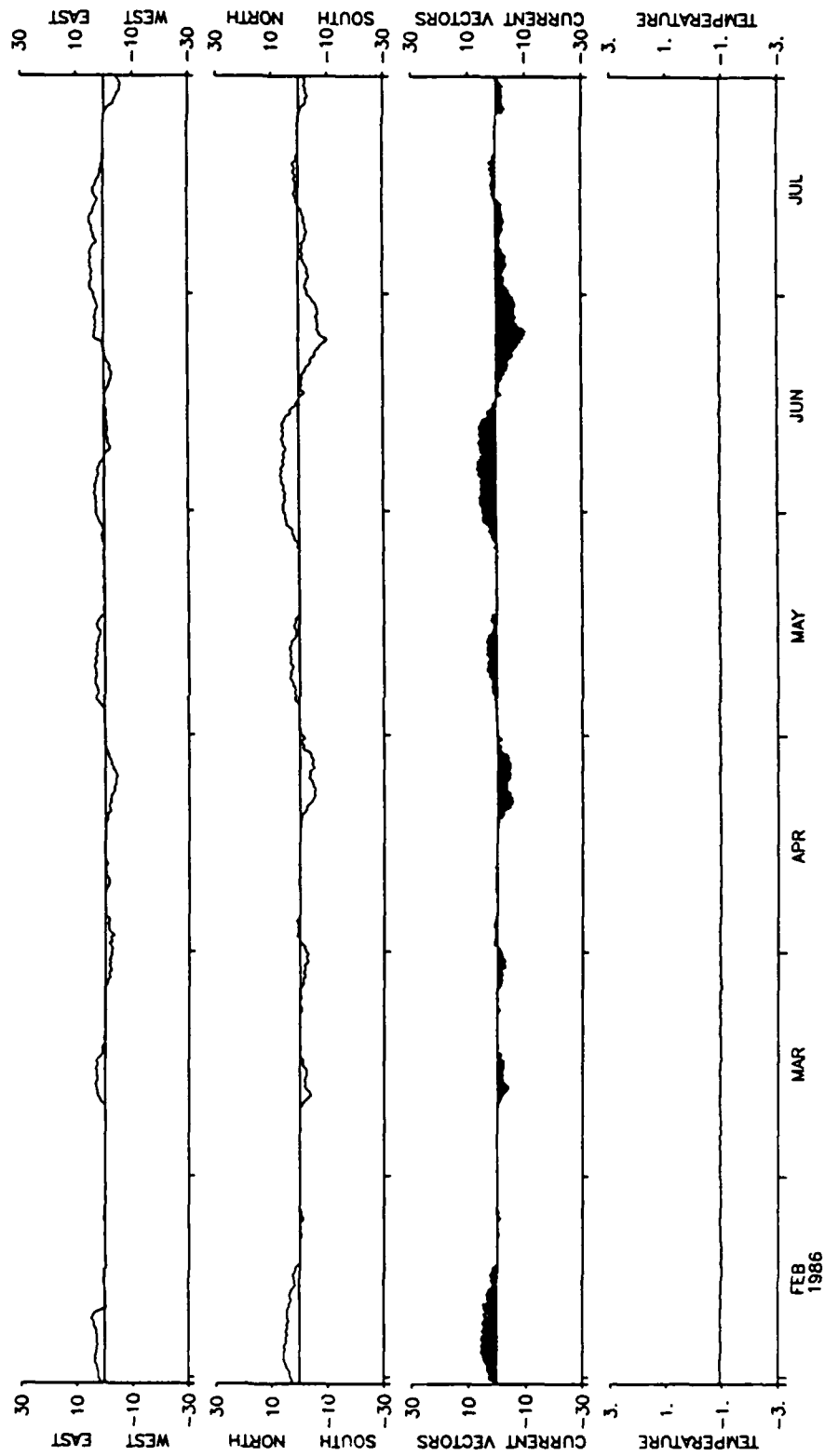
Recovered by R/V Valdivia, Hamburg, 08/23/86

Deployed with Mooring GB-2, 1985-86

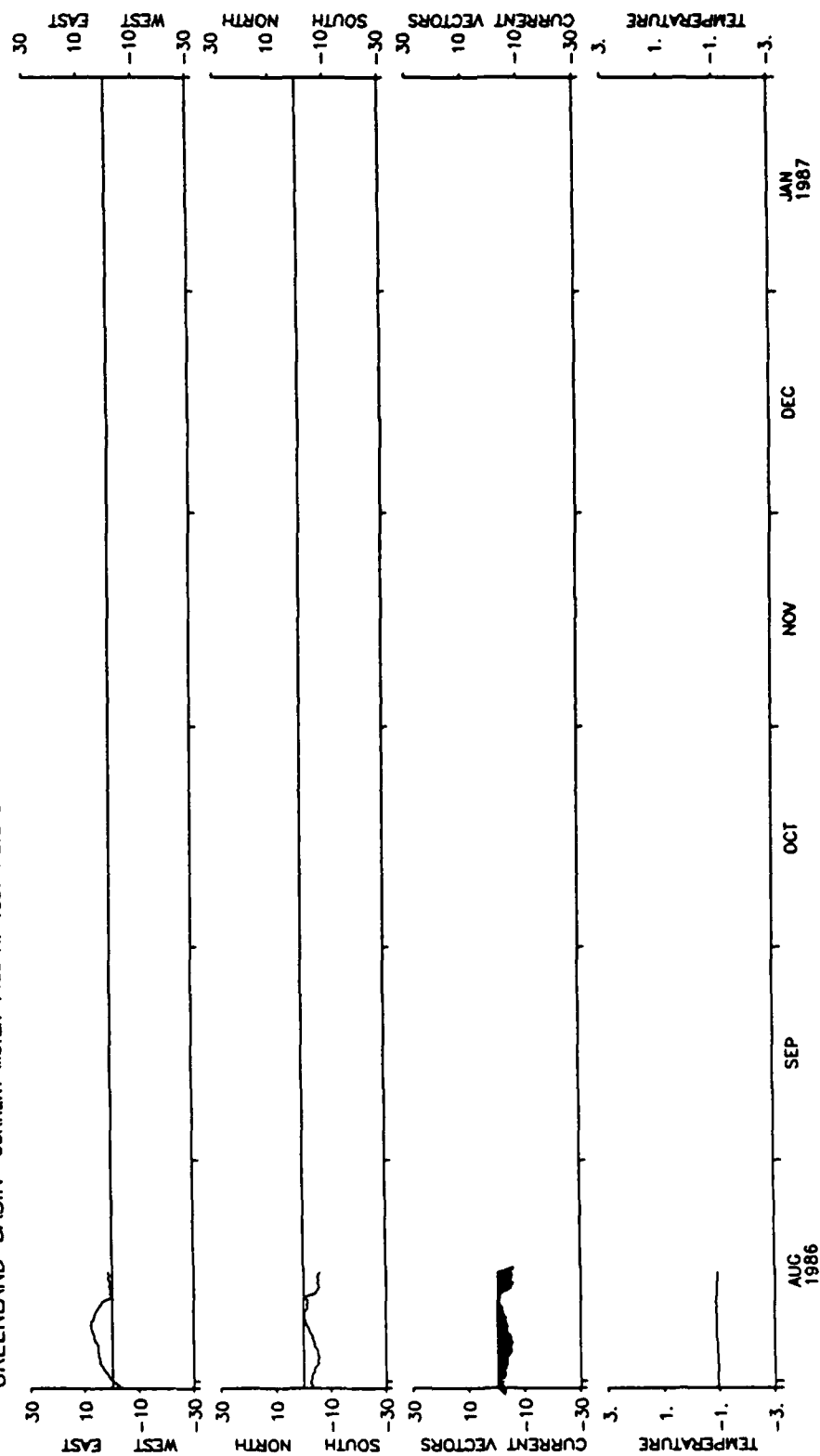
GREENLAND BASIN CURRENT METER 1485 AT 1857 METERS

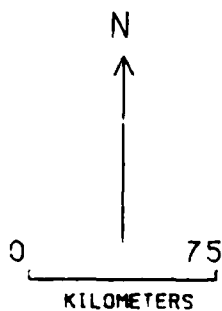


GREENLAND BASIN CURRENT METER 1485 AT 1857 METERS



GREENLAND BASIN CURRENT METER 1485 AT 1857 METERS



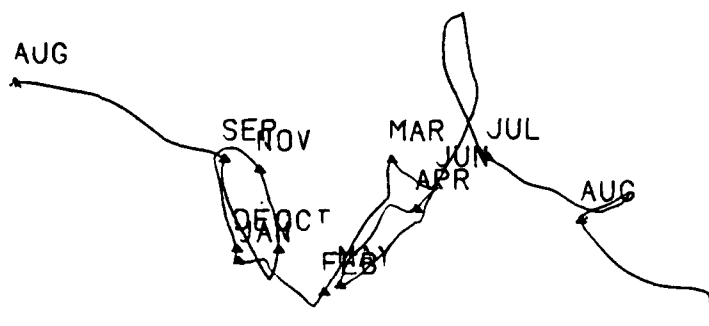


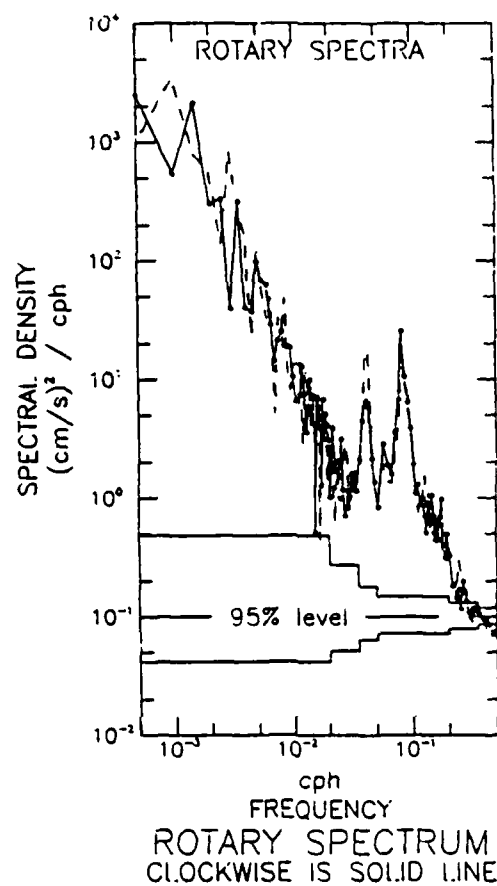
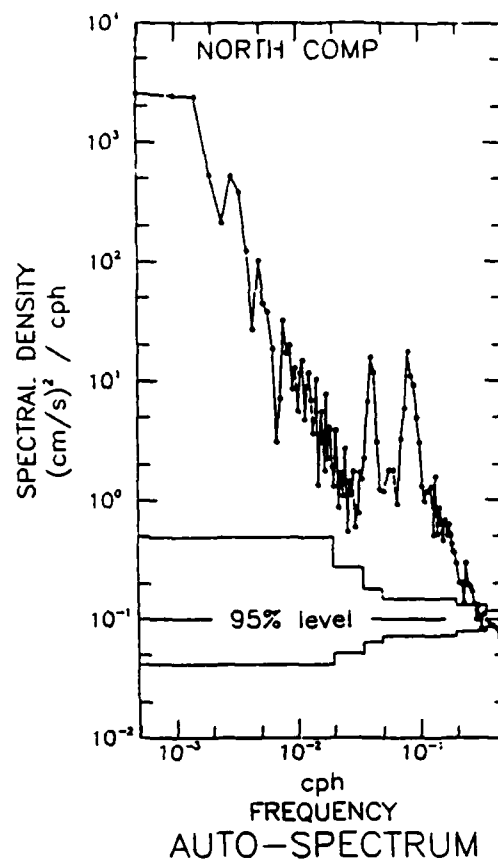
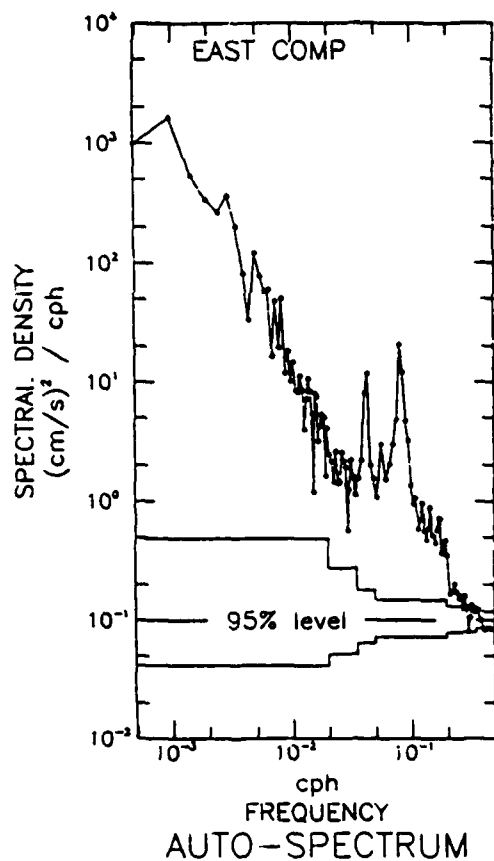
1485G

0 #M

85-VIII-01 TO 86-VIII-16

GB-2, 1,875 m





1485
85-86

Current Meter 2752

Greenland Basin

August 1, 1985 - April 19, 1986

74° 35'N

06° 43'W

2,923 meters

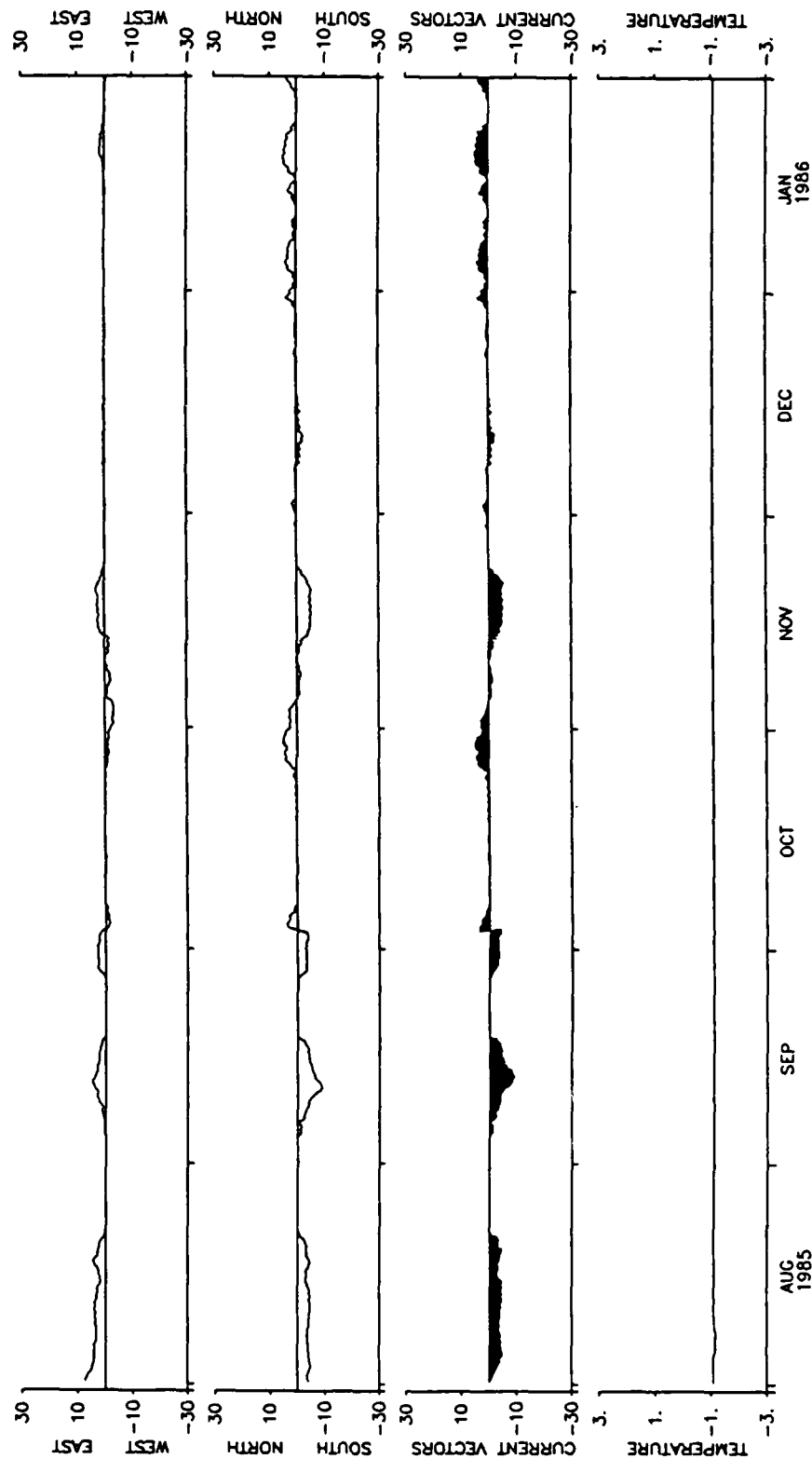
Record length: 6,264

Deployed by R/V Meteor, Hamburg, 08/02/85

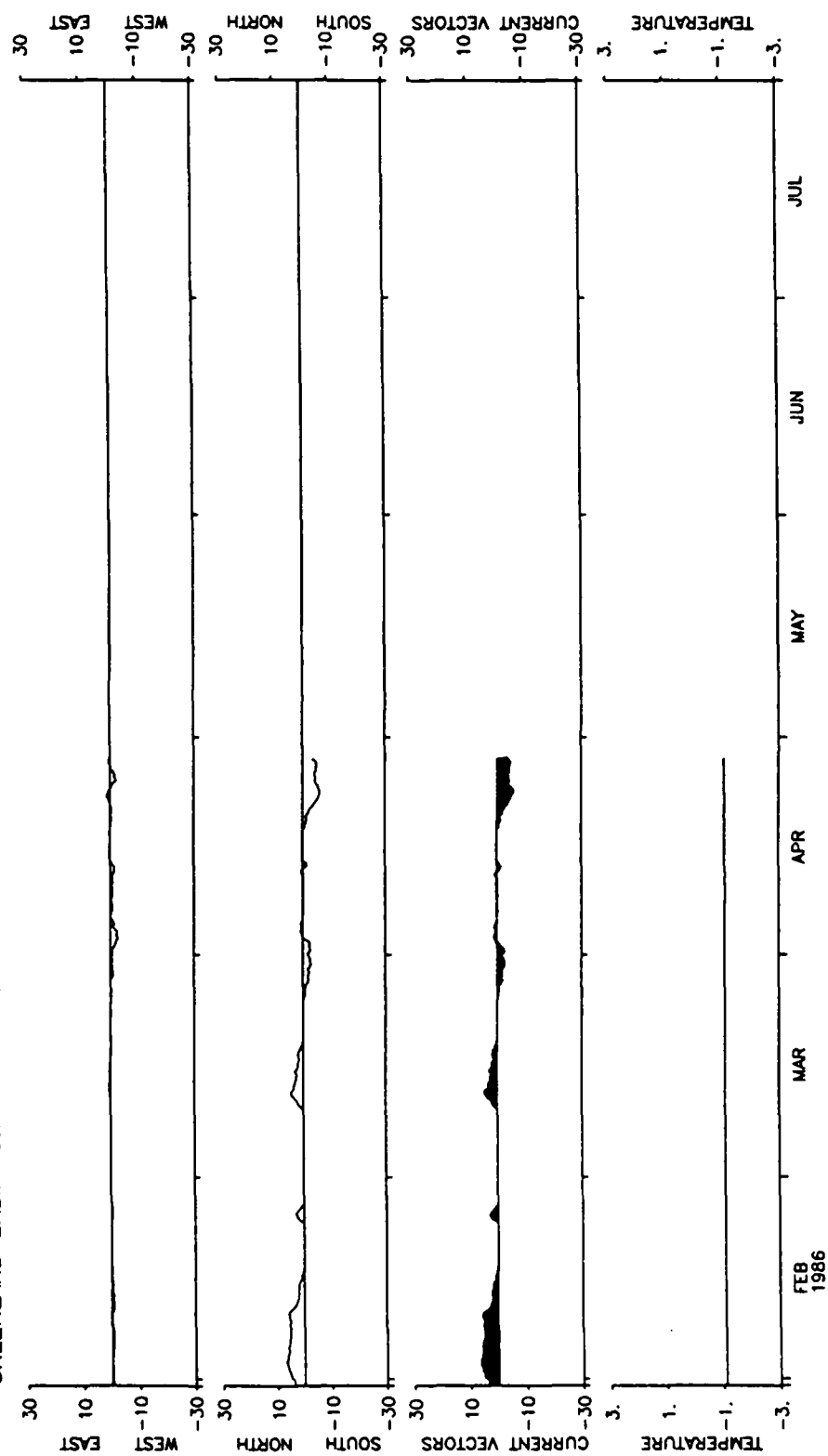
Recovered by R/V Valdivia, Hamburg, 08/23/86

Deployed with Mooring GB-2, 1985-86

GREENLAND BASIN CURRENT METER 2752 AT 2923 METERS



GREENLAND BASIN CURRENT METER 2752 AT 2923 METERS

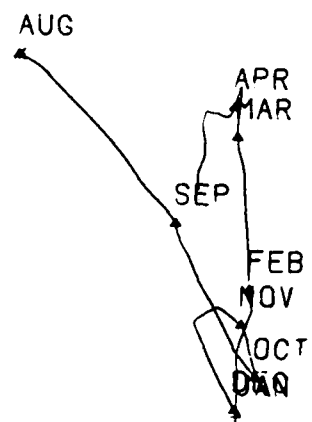


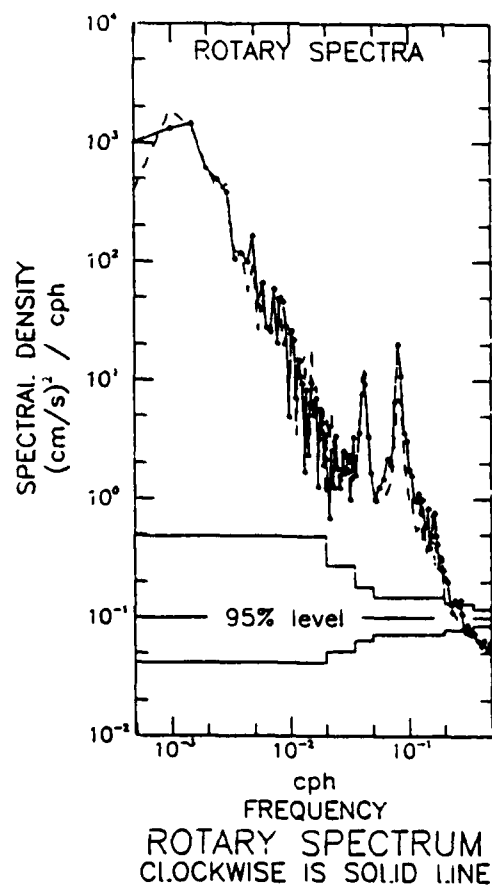
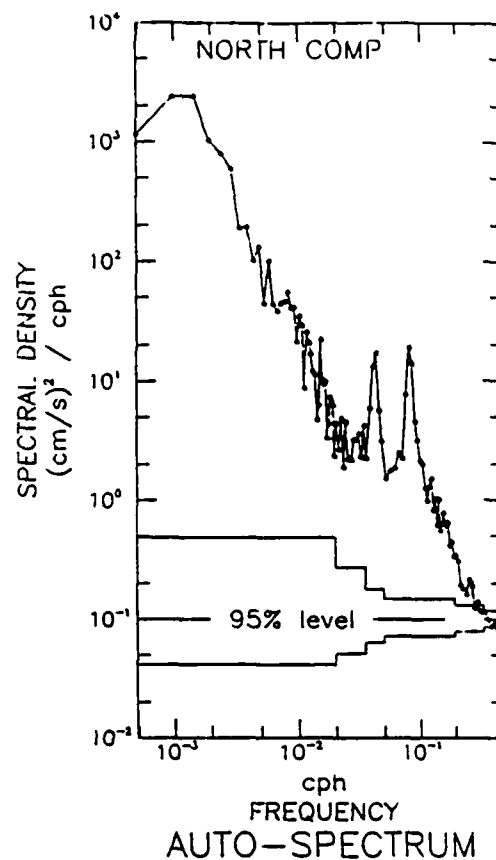
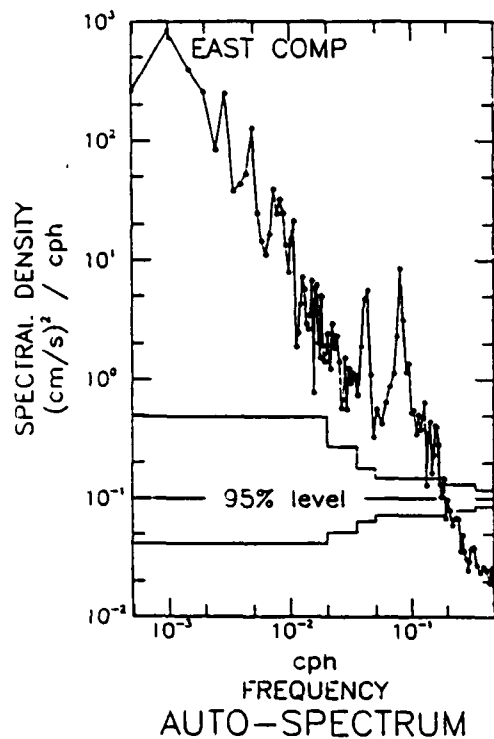
15-FEB-87 14.53



2752G
0 #M
85-VIII-01 TO 86-IV-27

GB-2, 2,923 m





2752
85-86

Current Meter 1484
and
Current Meter 1485

Greenland Basin

August 1, 1985 - April 16, 1986

74° 35'N

06° 43'W

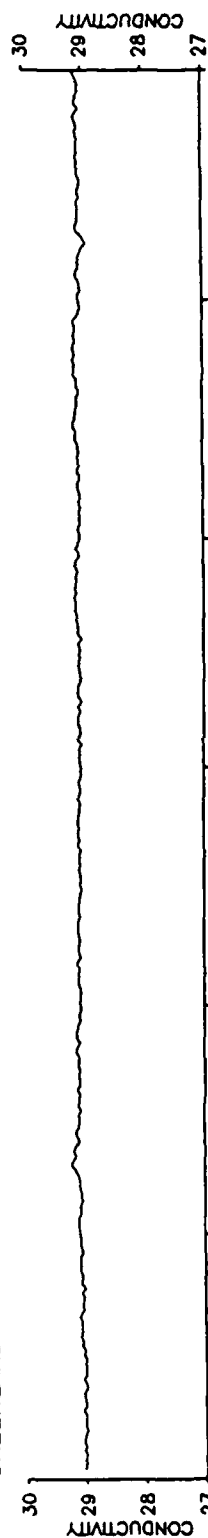
Conductivity Measurements

Deployed by R/V Meteor, Hamburg, 08/02/85

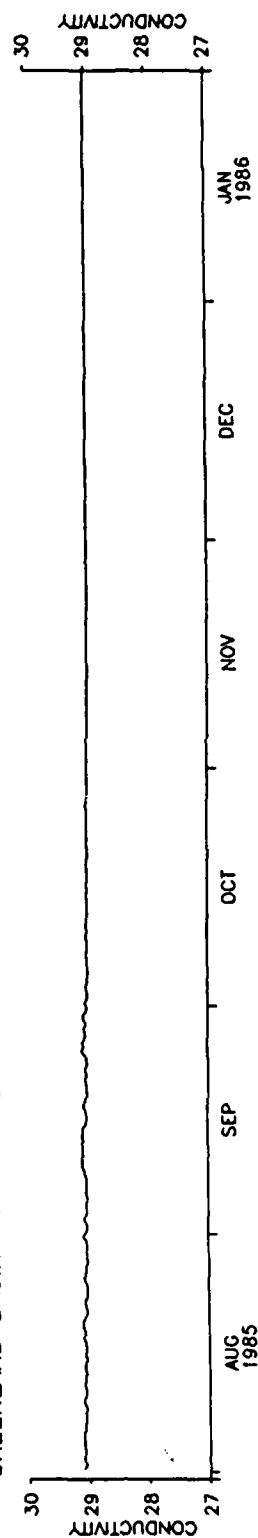
Recovered by R/V Valdivia, Hamburg, 08/23/86

Deployed with Mooring GB-2, 1985-86

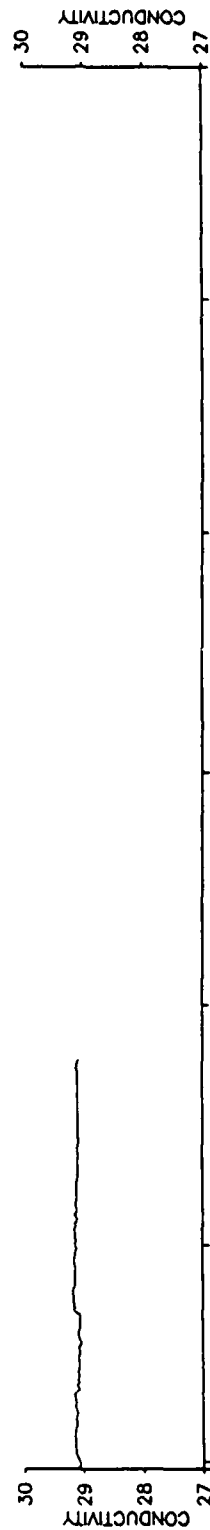
GREENLAND BASIN CURRENT METER 1484 AT 960 METERS



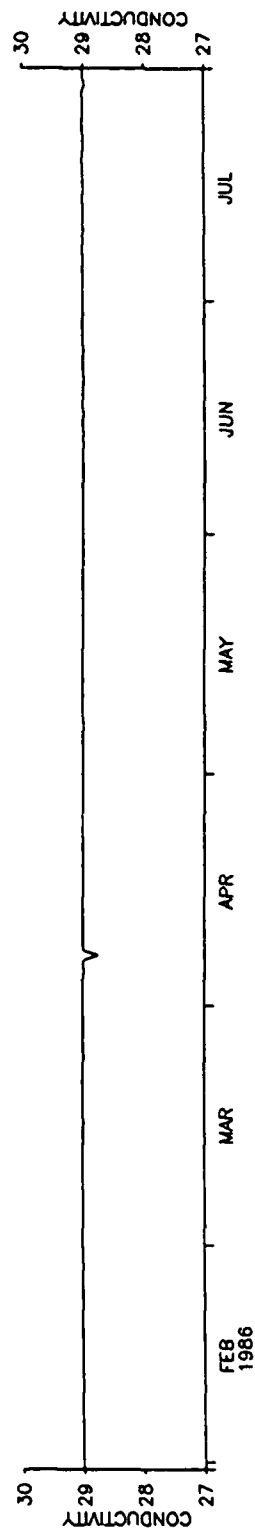
GREENLAND BASIN CURRENT METER 1485 AT 1857 METERS



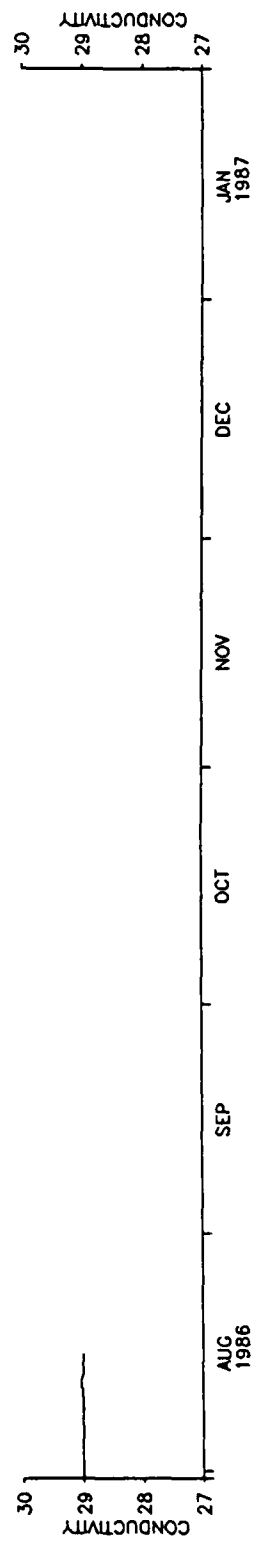
GREENLAND BASIN CURRENT METER 1484 AT 960 METERS



GREENLAND BASIN CURRENT METER 1485 AT 1857 METERS



GREENLAND BASIN CURRENT METER 1485 AT 1857 METERS



15-FCB-87 12.10

Greenland Basin

1985 - 1986

Vector Diagram

Three-dimensional plots

August 1, 1985 - August 20, 1986

(960 m, #1484)

1,857 m, #1485

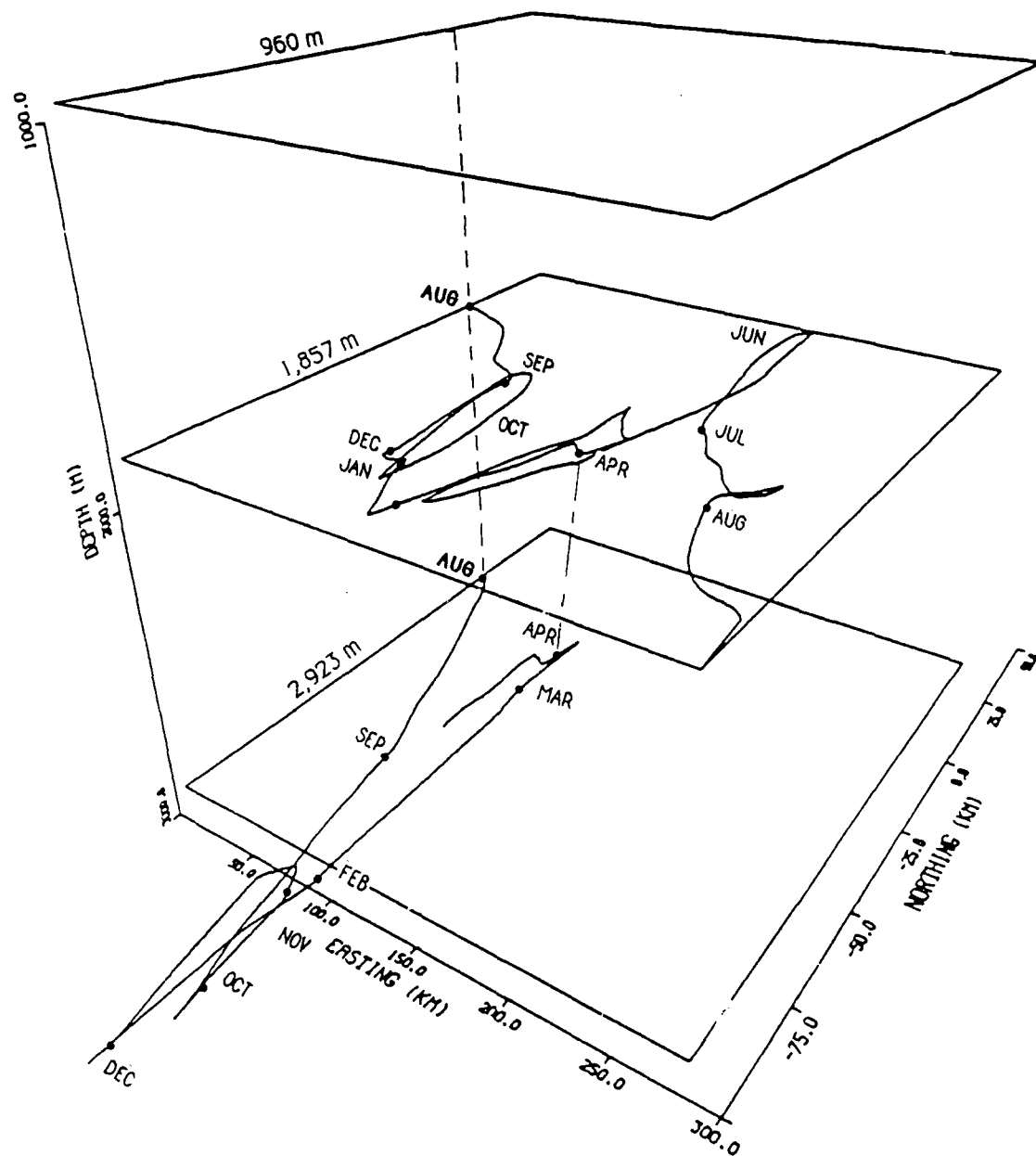
2,923 m, #2752

VECTOR DIAGRAM
GREENLAND BASIN, GB-2

74 35' N, 06 43' W

AUGUST, 1985 - AUGUST 1986

Anchor depth: 3,445 m



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